



**AUSTRALIAN AND NEW ZEALAND  
COLLEGE OF VETERINARY SCIENTISTS  
FELLOWSHIP GUIDELINES**

*Veterinary Emergency Medicine and Critical Care (VEMCC)*

**ELIGIBILITY**

1. The candidate shall meet the eligibility prerequisites for Fellowship outlined in the *Fellowship Candidate Handbook*.
2. Membership of the College must be achieved prior to the Fellowship examination.
3. Membership may be in Emergency Medicine and Critical Care, Anaesthesia and Critical Care or Anaesthesia and Analgesia, Veterinary Practice (Small Animal), Small Animal Medicine or Small Animal Surgery.

**OBJECTIVES**

To demonstrate that the candidate has attained sufficient knowledge, training, experience, and accomplishment to meet the criteria for registration as a specialist in Veterinary Emergency Medicine and Critical Care.

**LEARNING OUTCOMES**

**Definitions:**

**Emergency:** a condition that requires immediate attention in order to prevent deterioration or death.

**Critical illness:** conditions that affect organ/system function and require dedicated in-hospital treatment and monitoring to prevent deterioration while the underlying problem is being treated. The condition may or may not be life threatening.

**Emergency and Critical Care:** the discipline of veterinary medicine that focuses upon diagnosis and resolution of problems in both emergency and critically ill patients.

1. The candidate will have a **detailed**<sup>1</sup> knowledge of:
  - 1.1. The physiology of the cardiovascular, genito-urinary, respiratory, alimentary, musculoskeletal, endocrine, haemo-lymphatic, ophthalmological and neurological organ systems.
  - 1.2. The diagnosis, differential diagnosis and treatment of critical illness and emergency conditions in the dog and cat.
  - 1.3. The aetiology, pathogenesis and pathophysiology of cardiovascular, genito-urinary, respiratory, alimentary, musculoskeletal, endocrine, haemo-lymphatic, ophthalmological and neurological organ dysfunction in the cat and the dog.
  - 1.4. The aetiology, pathogenesis and pathophysiology of problems in critically ill patients.
  - 1.5. The surgical anatomy and pathology related to emergency conditions.
  - 1.6. Diagnostic tests and procedures as these apply to the diagnosis of critical illness and emergency disease conditions in the cat and the dog.
  - 1.7. Critical care medicine as it applies to the cat and the dog.
  
2. The candidate will have a **sound**<sup>1</sup> knowledge of:
  - 2.1. Canine and feline anatomy, physiology and pharmacology.
  - 2.2. Chemotherapeutics used for the treatment, control and management of critical illness and emergency disease conditions in the cat and the dog.
  - 2.3. Canine and feline nutrition and husbandry, especially as it applies to the management of disease conditions.
  - 2.4. Internal medicine, clinical pathology, anaesthesia and diagnostic imaging as they apply to the diagnosis and management of emergency and critically care cases.
  - 2.5. The surgical options, complications and outcomes of emergency conditions including but not limited to such examples as: gastric dilation and volvulus surgery with gastropexy, splenectomy, gastrointestinal foreign body removal, caesarean section, liver lobectomy, pyometra, ovariohysterectomy, diaphragmatic hernia repair, wound management including debridement and the use of appropriate drainage techniques.

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<sup>1</sup> Knowledge Levels:

**Detailed knowledge** - candidates must be able to demonstrate an in-depth knowledge of the topic including differing points of view and published literature. The highest level of knowledge.

**Sound knowledge** – candidate must know all of the principles of the topic including some of the finer detail, and be able to identify areas where opinions may diverge. A middle level of knowledge.

**Basic knowledge** – candidate must know the main points of the topic and the core literature.

3. The candidate will be able to, with a **detailed**<sup>2</sup> level of expertise:
  - 3.1. Collect, interpret and record clinical data in canine and feline emergency cases including:
    - 3.1.1. Historical and physical examinations of all body systems: detailed diagnostic expertise is required.
    - 3.1.2. The results of clinical pathology investigations; detailed diagnostic expertise is required.
    - 3.1.3. The results of diagnostic imaging examinations including radiography and ultrasound; sound diagnostic expertise is required.
    - 3.1.4. The results of diagnostic imaging examinations including but not limited to fluoroscopy, computed tomography and magnetic resonance imaging; basic level of expertise is required.
  - 3.2. Perform the following technical procedures:
    - 3.2.1. Positive pressure ventilation
    - 3.2.2. Blood pressure measurement (direct and indirect)
    - 3.2.3. Intravenous fluid therapy
    - 3.2.4. Transfusion therapy
    - 3.2.5. Central line placement and central venous pressure measurement
    - 3.2.6. Arterial catheter placement and arterial blood gas collection
    - 3.2.7. Body cavity centesis: thoracic, abdominal, pericardial
    - 3.2.8. Electrocardiography (routine)
    - 3.2.9. Peripheral and central parenteral nutrition
    - 3.2.10. Enteral nutrition tube placement
    - 3.2.11. Peritoneal dialysis
    - 3.2.12. Thoracostomy tube placement and use of continuous suction systems
    - 3.2.13. Closed and open chest CPR
    - 3.2.14. Cardiac output monitoring
    - 3.2.15. Tracheostomy
    - 3.2.16. FAST ultrasound techniques
    - 3.2.17. Toxicological decontamination techniques

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<sup>2</sup> Skill levels:

**Detailed expertise** – the candidate must be able to perform the technique with a high degree of skill, and have extensive experience in its application. The highest level of proficiency.

**Sound expertise** – the candidate must be able to perform the technique with a moderate degree of skill, and have moderate experience in its application. A middle level of proficiency.

**Basic expertise** – the candidate must be able to perform the technique competently in uncomplicated circumstances.

- 3.3. Analyse complex clinical problems and make sound clinical judgements.
  - 3.4. Communicate effectively with clients, referring veterinarians and peers.
  - 3.5. Integrate these skills to provide high-quality care for cats and dogs with the most efficient use of resources in a manner that is responsive to the owner's needs and wishes.
  - 3.6. Evaluate and incorporate new scientific information relevant to the practice of emergency medicine and critical care.
  - 3.7. Advance knowledge in emergency medicine and critical care through clinical innovation, research and publication.
4. The candidate will be able to, with a **sound** level of expertise:
- 4.1. Perform the following surgical procedures:
    - 4.1.1. Gastric dilation and volvulus surgery with gastropexy
    - 4.1.2. Splenectomy
    - 4.1.3. Gastrointestinal foreign body removal
    - 4.1.4. Exploratory laparotomy
    - 4.1.5. Caesarean section
    - 4.1.6. Pyometra ovariohysterectomy
    - 4.1.7. Diaphragmatic hernia repair
    - 4.1.8. Wound management including debridement, suture placement, use of appropriate drainage techniques
    - 4.1.9. Cystostomy tube placement
    - 4.1.10. Wound management and temporary stabilisation of open fractures and shearing injuries
  - 4.2. Perform the following technical procedures:
    - 4.2.1. Joint fluid aspiration
    - 4.2.2. Bone marrow biopsy and aspiration
    - 4.2.3. Cerebrospinal fluid collection
    - 4.2.4. Endoscopy of the respiratory and alimentary tracts
    - 4.2.5. Transtracheal aspiration and bronchoalveolar lavage
    - 4.2.6. Biopsy techniques (fine needle aspiration, with and without imaging guidance).
    - 4.2.7. Pericardiocentesis
    - 4.2.8. Radiographic contrast studies of the gastrointestinal and urinary systems
    - 4.2.9. Abdominal ultrasound and basic echocardiography

## EXAMINATIONS

Refer to the *Fellowship Candidate Handbook*, Section 5.

The Fellowship examination has **four separate, autonomous components**:

- 1. Written Paper 1** (*Component 1*)  
Principles of the Subject (four hours)
- 2. Written Paper 2** (*Component 2*)  
Applied Aspects of the Subject (four hours)
- 3. Practical Examination** (*Component 3*)  
Practical (approximately two and a half hours)
- 4. Oral Examination** (*Component 4*)  
Oral (approximately one hour)

The written examination will comprise of two separate four-hour written papers taken on two consecutive days. There will be an additional 20 minutes perusal time for each paper, during which no writing in an answer booklet is permitted. In paper one you will be provided with one (1) essay question worth 60 marks, five (5) short answer questions worth twenty-four (24) marks each and ten (10) short answer questions worth six (6) marks each. In paper two you are provided with five (5) questions to answer worth 48 marks each, giving a total of 240 marks per paper. There is no choice of questions. Marks allocated to each question and to each subsection of questions will be clearly indicated on the written paper.

### Written Paper 1:

This paper is designed to test the candidate's knowledge of the principles of Veterinary Emergency Medicine and Critical Care as described in the Learning Outcomes. Answers may cite specific examples where general principles apply, but should primarily address the theoretical basis underlying each example.

### Written Paper 2:

This paper is designed to (a) test the candidate's ability to apply the principles of Veterinary Emergency Medicine and Critical Care to particular cases/problems or tasks, and to (b) test the candidate's familiarity with the current practices and current issues that arise from activities within the discipline of Veterinary Emergency Medicine and Critical Care in Australia and New Zealand.

**Practical Examination:**

The practical examination is designed to test practical aspects of the Learning Outcomes. The practical examination may consist of a combination of radiographic and ultrasound images, electrocardiographs, cytological samples, computer based problem solving and clinical pathology data with associated questions. The scope of the examination will not necessarily be restricted to these types of data. Written answers will be required. No perusal time will be given for the practical exam. The practical will consist of a series of five (5) questions with sub-questions, equating to a total of 150 marks. Marks allocated to each question and to each sub-section will be clearly indicated on the written paper.

**Oral Examination:**

The oral examination is approximately one hour in duration and is designed to test practical aspects of the Learning Outcomes. To pass this examination, the candidate must be aware of current literature and be able to debate on controversial issues. Four (4) cases are presented with supporting questions asked verbally in a face-to-face setting. The oral examination has a total of 60 marks with each case allocated 15 marks. Diagnostic images such as radiographs, ultrasound frames or video loops, and CT as well as laboratory test results; electrocardiographs and images of equipment may be used during this examination.

## TRAINING PROGRAMS

In addition to the Requirements of the *Fellowship Candidate Handbook* the VEMCC Fellowship Guidelines impose the requirements as detailed below:

Refer to Appendix 3: Clinical Skills Checklist and Appendix 4: Clinical Knowledge Checklist for helpful guides to the breadth of technical procedures and clinical knowledge that should be accomplished by the candidate during training. These lists are not exclusive and are guides only.

### FULL TIME FORMAL TRAINING PROGRAM REQUIREMENTS

The period of training is a minimum of 121 weeks.

This will take the form of a structured residency training program over three years consisting of a minimum of 96 weeks of full-time, directly supervised training in veterinary emergency medicine and critical care and allied specialties. In addition, candidates will complete 25 weeks of independent practice.

#### 1. 96 weeks full time Directly Supervised Training.

This includes:

1.1. Externship/s (see the *Fellowship Candidate Handbook* for additional details)

1.1.1. Complete at least four weeks of externship(s) at a different institution to where the candidate primarily trained. These four weeks are to consist of either two lots of two week blocks at two different institutions or one four week block at the same venue

1.2. Training in Related Disciplines (TRD): directly supervised training in disciplines related to but other than the primary discipline.

1.2.1. Eighteen weeks (= 90 days) of directly supervised training in related specialties, supervised by a recognised specialist in that specialty discipline

1.2.2. The following core rotations and time periods must be completed:

Surgery	4 weeks
Medicine	4 weeks
Anaesthesia	2 weeks
Diagnostic Imaging	2 weeks
Neurology	2 weeks
Cardiology	1 week

The final three weeks are elective and can be chosen from ophthalmology, oncology and clinical pathology.

1.2.3. Guidelines for TRD are to be found in **Appendix 2**.

### 1.3. Conferences/courses/other training sessions

1.3.1. Seminars and conferences in an aspect of the discipline where at least 25% of the sessions attended are presented by a recognised specialist in Emergency Medicine and Critical Care.

1.3.2. All seminars and conferences must be documented (title, date, location, speaker, length).

## 2. 25 weeks independent practice in a 24-hour emergency facility

Independent practice is defined as full-time work in a facility that complies with the minimum standards for 24-hour facilities. A 24-hour facility is defined as one in which both veterinary and support staff are available for treatment of new accessions and hospitalised animals 24 hours a day, 7 days a week. This work may focus on clinical practice or supervisory duties. Direct daily contact with the supervisor is not required but an Activity Log Summary must be maintained throughout this period as per:

2.1. Template *Activity Log Summary* (By Species), **Appendix 1a**

and

2.2. Template *Activity Log Summary* (By Body System), **Appendix 1b**.

Details of the work to be undertaken during this period must be clearly indicated in the training program submission. The name of the practice and location may be approved by the TCC *after* the training program has commenced but approval must be obtained *before* this time is started.

## 3. Activity log summary requirements

The Activity Log Summary (ALS) must be recorded throughout supervised training in the primary discipline. It should be divided by species and body system using the template examples provided in **Appendix 1**. The Activity Log Summary shall use the following categories:

- Neurological
- Haemo-lymphatic
- Endocrine
- Respiratory
- Cardiovascular
- Alimentary
- Genito-Urinary
- Musculo-Skeletal
- Ophthalmological
- Miscellaneous other (including dermatological, behavioural, etc)

The candidate must keep a log of **ALL** cases managed as described in Appendix 1.

It is recommended the candidate logs at least 500 cases during the training program across the breadth of body systems.



In an attempt to ensure adequate exposure to the variety of medical cases seen, the Chapter suggests the following minimum of cases per body system (as set out in the Activity Log Summary):

Neurological	30
Haemo-lymphatic	30
Endocrine	30
Respiratory	30
Cardiovascular	30
Alimentary	30
Genito-Urinary	30
Musculo-Skeletal	30
Ophthalmological	20
Miscellaneous	10

Any single case can be allocated to a single organ system that most appropriately describes the major clinical problem.

**4. Teaching requirements:** Both of the following requirements must be met:

4.1. At least six hours of formal lectures on emergency/critical care topics to veterinary students, veterinary nurses, staff or veterinary audiences. The intention of this requirement is to give the resident an opportunity to extensively research and prepare a formal presentation to teach a veterinary audience in the style of a lecture. As such, the following would be expected of a formal lecture: advanced notification and promotion of the event, a substantial audience of at least 10 or more people, preparation of explanatory material to assist the presenter (e.g., a powerpoint presentation), a handout for attendees to use as reference material and be presented live such that the audience can ask questions of the presenter.

**and**

4.2. Teaching in clinical or laboratory settings for a minimum of six hours. It is expected that these sessions teach a practical, hands-on skill, and that the resident has thoroughly researched and practised those skills themselves in advance of the session. The intention of and requirements would be the same as for a formal lecture, however a smaller audience would be acceptable. A hands-on component is required and the resident must have mastered the skill themselves and be thoroughly informed of the literature relating to the skill in order to effectively train others in this skill. It is not a requirement that these are wet laboratories with cadavers.

All teaching activities must be documented using the template provided in Appendix 5. and submitted as part of the Credentials document. Credit will only be given once for a topic.

**5. Educational requirements:** two (2) of the following three requirements must be met:

- 5.1. Active participation for a minimum of two years in seminars on a wide range of topics related to emergency and critical care. The intention of the seminars is to provide mentored exposure to the fundamentals of the discipline at a specialist level and critical evaluation of the scientific literature.
  - 5.1.1. Active participation is defined as attendance and participation in seminars on a rostered basis.
  - 5.1.2. This training may be received at a veterinary or human training facility.
  - 5.1.3. A registered specialist must be in attendance.
  - 5.1.4. All seminars and conferences must be documented using the template provided in Appendix 6.
  - 5.1.5. Must comprise at least 100 hours accrued over not less than two years.
  - 5.1.6. Seminars would include activities such as journal club, morbidity and mortality rounds and pathophysiology reviews.
- 5.2. A minimum of 50 hours continuing education gained at not less than two conferences in the subject of VEMCC.
- 5.3. Participation in a post graduate degree or fellowship program in an allied biomedical science (e.g. physiology, pharmacology, cardiovascular studies, toxicology) involving didactic courses and research experience that is associated with the discipline of emergency/critical care.

Pre-approval of the post-graduate degree or fellowship program must be obtained at the time the training document is submitted.

## **REQUIREMENTS OF SUPERVISORS**

As of January 2020, all new Fellowship Candidates must have a minimum of two Supervisors. All Candidates must have a Primary Supervisor and either a Secondary Supervisor or an Auxillary Supervisor. The following are the requirements of Supervisors:

1. Primary Supervisor: must hold a Specialist qualification in emergency and critical care (i.e., Fellowships, American/European Diplomate). This supervisor is able to provide Directly Supervised Training in the subject of Veterinary Emergency Medicine and Critical Care and is the supervisor present for >50% of those training weeks. The Primary Supervisor must be on-site.
2. Secondary Supervisor: must hold a Specialist qualification in Emergency and Critical Care (i.e., Fellowships, American/European Diplomate). This supervisor is able to provide Directly Supervised Training in the subject of Veterinary Emergency Medicine and Critical Care and is the supervisor present for <50% of those training weeks. This Supervisor may be off-site. This Supervisor must meet with the

Candidate every 6 months to discuss the Candidate's progress and must be present for the meeting related to the Candidate's Annual Supervisor Report along with the Primary Supervisor.

3. Auxiliary Supervisor: must hold a Specialist qualification (i.e., Fellowships, American/European Diplomate) in one of the allied specialties of Internal Medicine, Anaesthesia or Surgery. This supervisor is unable to provide Directly Supervised Training but can provide advice and support for the Candidate during their program. This Supervisor must meet with the Candidate every 6 months to discuss the Candidate's progress and must be present for the meeting related to the Candidate's Annual Supervisor Report along with the Primary Supervisor.

## **PUBLICATIONS AND PRESENTATION**

Refer to the *Fellowship Candidate Handbook Section 2.10*

## **RECOMMENDED READING LIST**

The candidate is expected to research the depth and breadth of the knowledge of the discipline. This list is intended to guide the candidate to some core references and source material. It is neither proscriptive nor restrictive. The list is not comprehensive and is not intended as an indicator of the content of the examination.

### **Textbooks (core texts are marked with an \*)<sup>3</sup>**

#### **General Physiology\***

One of:

1. Ganong's Review of Medical Physiology 24<sup>th</sup> ed, Ganong, 2012
2. Medical Physiology 3<sup>rd</sup> ed, Boron, 2016
3. Textbook of Medical Physiology 13<sup>th</sup> Ed, Guyton and Hall, 2015
4. Berne & Levy Physiology 6<sup>th</sup> ed, Koeppen & Stanton, 2009

#### **Respiratory Physiology\***

One of:

1. Respiratory Physiology: The Essentials 10<sup>th</sup> ed, West, 2015
2. Pulmonary Pathophysiology 8<sup>th</sup> ed, West, 2012
3. Nunn's Applied Respiratory Physiology 8<sup>th</sup> ed, Lumb, 2016

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<sup>3</sup> Textbook Definitions:

**Core textbook** – candidates are expected to own a copy of the textbook and have a detailed knowledge of the contents.

**Recommended textbook** – candidates should own or have ready access to a copy of the book and have a sound knowledge of the contents.

**Additional references** – candidates should have access to the book and have a basic knowledge of the contents

**Additional Reading Materials** - These are conference proceedings, other non-refereed publications and other journals that would offer some information in the subject area including differing points of view, but are not required reading.

### **Cardiovascular Physiology\***

One of:

1. Cardiovascular Physiology 10<sup>th</sup> ed, Levy and Pappano, 2013
2. Cardiovascular Physiology 8<sup>th</sup> ed, Lange Series, 2014
3. Cardiovascular Physiology Concepts 2<sup>nd</sup> ed, Klabunde, 2011

### **Renal Physiology\***

One of:

1. Vander's Renal Physiology 8<sup>th</sup> ed, Eaton & Pooler 2013
2. Renal Physiology 5<sup>th</sup> ed, Koeppen, Stanton 2012
3. Clinical Physiology of Acid-Base and Electrolyte Disorders 5<sup>th</sup> ed, Rose & Post, 2001

### **Human Intensive Care**

One of:

1. Textbook of Critical Care 6<sup>th</sup> ed, Vincent, Abraham, Kochanek, Moore, Fink, 2011
2. Critical Care Medicine Principles of Diagnosis & Management in the Adult 4<sup>th</sup> ed, Parrillo & Dellinger, 2014
3. Civetta, Taylor and Kirby's Critical Care 4<sup>th</sup> ed, Gabrielli, Layon, Yu. 2009

AND

4. The ICU Book, 4<sup>th</sup> ed, Marino, 2013\*

### **Fluid Therapy / Acid-Base / Electrolyte**

1. Fluid, Electrolyte, and Acid-Base Disorders in Small Animal Practice 4<sup>th</sup> ed, Di Bartola 2011\*

### **Veterinary Emergency and Critical Care**

1. Small Animal Critical Care Medicine 2<sup>nd</sup> ed, Silverstein & Hopper, 2015\*
2. Advanced Monitoring and Procedures for Small Animal Emergency and Critical Care, Burkett-Creedon, 2012\*
3. Veterinary Emergency Critical Care Manual 2<sup>nd</sup> ed, Mathews, 2006
4. Manual of Small Animal Emergency & Critical Care Medicine 2<sup>nd</sup> ed, Macintire *et al*, 2012
5. Veterinary Emergency and Critical Care Procedures 2<sup>nd</sup> ed, Hackett & Mazzaferro, 2012
6. Textbook of Small Animal Emergency Medicine 1<sup>st</sup> Ed Drobatz, Hopper, Rozanski, Silverstein 2018

### **Veterinary Internal Medicine**

1. Textbook of Veterinary Internal Medicine 7<sup>th</sup> ed, Ettinger & Feldman 2010

## **Veterinary Surgery**

One of:

1. Veterinary Surgery: Small Animal, Tobias and Johnston, 2012
2. Small Animal Surgery 4<sup>th</sup>3<sup>rd</sup> ed, Fossum. 2012

## **Veterinary Cardiology**

One of:

1. Manual of Canine and Feline Cardiology 5<sup>th</sup> ed, Smith *et al*, 2015
2. Cardiovascular Disease in Small Animal Medicine, Ware, 2011

## **Veterinary Anaesthesia**

One of:

1. Veterinary Anesthesia & Analgesia 5<sup>th</sup> ed, Grimm *et al*, 2015
2. Veterinary Anaesthesia, Dugdale, 2010
3. Handbook of Veterinary Anesthesia 5<sup>th</sup> Ed, Muir & Hubbell, 2012

## **Mechanical Ventilation**

One of:

1. Essentials of Mechanical Ventilation 3<sup>rd</sup> ed, Hess & Kacmarek, 2014
2. Principles and Practice of Mechanical Ventilation 3<sup>rd</sup> ed, Tobin, 2012
3. Mechanical Ventilation: Physiological and Clinical Applications 6<sup>th</sup> ed, Cairo, 2015
4. Mechanical Ventilation 2<sup>nd</sup> ed, MacIntyre & Branson, 2009

## **Veterinary Pharmacology**

One of:

1. Small Animal Clinical Pharmacology and Therapeutics 2<sup>nd</sup> ed, Boothe, 2011
2. Small Animal Clinical Pharmacology 2<sup>nd</sup> ed, Maddison *et al*, 2008

## **Veterinary Toxicology\***

One of:

1. Veterinary Toxicology: Basic and Clinical Principles 2<sup>nd</sup> ed, Gupta, 2012
2. Small Animal Toxicology 3<sup>rd</sup> ed, Peterson & Talcott, 2013
3. Clinical Veterinary Toxicology, Plumlee 2003

## **Veterinary Clinical Pathology**

One of:

1. Duncan & Prasse's Veterinary Laboratory Medicine: Clinical Pathology 5<sup>th</sup> ed, Latimer, 2011
2. Small Animal Clinical Diagnosis by Laboratory Methods 5<sup>th</sup> ed, Willard & Tvedten, 2012
3. Fundamentals of Veterinary Clinical Pathology 2<sup>nd</sup> ed, Stockham & Scott, 2008

### **Veterinary Pneumology**

1. Clinical Canine and Feline Respiratory Medicine, Johnson, 2010

### **Veterinary Endocrinology**

1. Canine and Feline Endocrinology and Reproduction 4<sup>th</sup> edition, Feldman & Nelson 2015

### **Veterinary Infectious Diseases**

1. Infectious Diseases of the Dog and Cat 4<sup>th</sup> ed, Greene 2011

### **Veterinary Ophthalmology**

One of:

1. Essentials of Veterinary Ophthalmology 3<sup>rd</sup> ed, Gelatt, 2014
2. Slatter's Fundamentals of Veterinary Ophthalmology 5<sup>th</sup> ed, Maggs, Miller & Ofri, 2013

### **Veterinary Neurology**

One of:

1. Handbook of Veterinary Neurology 5<sup>th</sup> ed, Lorenz, Coates & Kent, 2010
2. A Practical Guide to Canine and Feline Neurology 3<sup>rd</sup> ed, Dewey, 2015
3. Veterinary Neuroanatomy and Clinical Neurology 3<sup>rd</sup> ed, de Lahunta & Glass 2008
4. BSAVA Manual of Canine and Feline Neurology 4<sup>th</sup> ed, Platt and Olby, 2013
5. Small Animal Neurological Emergencies, Platt and Garosi, 2012

### **Veterinary Oncology**

One of:

1. Withrow & MacEwen's Small Animal Clinical Oncology 5<sup>th</sup> ed, Withrow & Vail, 2013
2. BSAVA Manual of Canine and Feline Oncology 3<sup>rd</sup> ed, Lascelles and Dobson, 2011

### **Veterinary Paediatrics**

One of:

1. Small Animal Pediatrics: The First 12 Months of Life, Peterson & Kutzler, 2011
2. BSAVA Manual of Canine and Feline Reproduction and Neonatology 2<sup>nd</sup> ed, England & von Heimendahl, 2010

## **Journals<sup>4</sup>**

The journals listed below contain original and review papers that are suitable for preparation for the Fellowship examination.

### **Titles in Veterinary Emergency and Critical Care**

Journal of Veterinary Emergency and Critical Care  
Journal of the American Veterinary Medical Association  
American Journal of Veterinary Research  
Veterinary Clinics of North America  
Journal of Veterinary Internal Medicine  
Australian Veterinary Journal  
Australian Veterinary Practitioner  
Journal of the American Animal Hospital Association  
Journal of Feline Medicine and Surgery  
Journal of Veterinary Cardiology  
Veterinary Anaesthesia and Analgesia  
Veterinary Surgery  
Veterinary Radiology and Ultrasound

### **Titles in Human Emergency and Critical Care**

Critical Care Medicine  
Shock  
Journal of Trauma  
New England Journal of Medicine  
Anaesthesia and Intensive Care  
Chest  
Critical Care Clinics  
Current Opinion in Critical Care  
Intensive Care Medicine

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<sup>4</sup> Journal Definitions:

**Core Journal** – candidates are expected to have ready access to either print or electronic versions of the journal and have a detailed knowledge of the published articles in the subject area.

**Recommended Journal** – candidates should have ready access to either print or electronic versions of the journal and have a sound knowledge of the published articles in the subject area.

**Additional Journal** – candidates should be able to access either printed or electronic versions of the journal and have a basic knowledge of the published articles in the subject area.

## **FURTHER INFORMATION**

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**APPENDIX 1a****Activity Log Summary (By Species)***(Template):***NAME:** A. Candidate**SUBJECT:** Veterinary Emergency and Critical Care**DATE:****Number of Cases**

<b>CATEGORY</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUNE</b>	<b>JULY</b>	<b>AUG</b>	<b>SEPT</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>Current TOTAL</b>	<b>Previous TOTAL</b>	<b>Cumulative TOTAL</b>
CANINE	21	28	30	25	32	33									
FELINE	2	6	6	9	11	10									
OTHER	0	0	0	0	0	0									
Current TOTAL	23	34	36	34	43	43									
Previous TOTAL	0	0	0	0	0	0									
Cumulative TOTAL	23	34	36	34	43	43									

**APPENDIX 1b****Activity Log Summary (By Body System) (Template)**NAME: **A. Candidate**SUBJECT: **Veterinary Emergency and Critical Care**

DATE:

**Number of Cases/Activities**

CATEGORY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	Current TOTAL	Previous TOTAL	Cumulative TOTAL
Neurological															
Haemo-lymphatic															
Endocrine															
Respiratory															
Cardiovascular															
Alimentary															
Genito-urinary															
Musculoskeletal															
Ophthalmological															
Miscellaneous															
Current TOTAL															
Previous TOTAL															
Cumulative TOTAL															

## **Appendix 2: Training in related disciplines guidelines**

Throughout the training program, the candidate must be exposed to and actively involved in training in several related disciplines. The candidate is encouraged to develop a working relationship with one or more specialists in each discipline to facilitate regular discussion and interaction regarding case management. In addition, involvement and participation of a specialist in these disciplines in clinical rounds and seminars attended by the candidate is encouraged, as is participation of the candidate in relevant rounds and seminars specific to this discipline.

The candidate must ensure that time spent in training in related disciplines is effective in consolidating knowledge and skills and in covering aspects of this discipline that will not be addressed adequately during the remainder of their program. The candidate is expected to be proactive in searching out opportunities, materials and expert tuition and in compiling and organizing relevant material for future reference.

### **Training in the related discipline of small animal surgery**

Essential areas that should be covered include but are not limited to:

1. Principles of asepsis and surgical sterility
2. Tissue handling techniques including suturing patterns, use of stapling and drainage devices.
3. The approach to common surgical emergencies including but not limited to gastric dilation and volvulus surgery with gastropexy, splenectomy, gastrointestinal foreign body removal, caesarean section, liver lobectomy, pyometra, ovariohysterectomy, diaphragmatic hernia repair, wound management including debridement and the use of appropriate drainage techniques.

### **Training in the related discipline of small animal medicine**

Essential areas that should be covered include but are not limited to:

1. Formulation of a treatment plan that encompasses the medical needs of the critically ill patient. Developing the ability to consider an overall view of the patient's situation should be promoted
2. Monitoring the patient's response to treatment and modifying treatment as indicated
3. Ongoing medical treatment after stabilisation of critical illness
4. Indications for laboratory and other diagnostic tests and interpretation of results

## **Training in the related discipline of diagnostic imaging**

Training in this discipline is an extremely important component of the training program. Emergency clinicians may be directly responsible for performing (or supervising the performance of) and interpreting diagnostic imaging studies. It is essential that the candidate be competent in performing or supervising imaging studies, particularly using radiography and ultrasonography, and is able to perform the immediate and timely interpretation of findings, correlate these studies with clinical findings and make appropriate decisions for determining the treatment of the patient. A methodical and thorough approach to interpretation of images must be developed.

Topics to be reviewed throughout the training program, and techniques to gain practical experience with, include but are not limited to the following as they apply to the critically ill or emergency patient:

1. Principles, indications, limitations, application and interpretation of the following imaging modalities:
  - 1.1. Radiography including digital radiography, contrast radiography and fluoroscopy
  - 1.2. Ultrasonography including ultrasonography of the abdomen and thorax
  - 1.3. Computed tomography (CT)
  - 1.4. Magnetic resonance imaging (MRI)
  - 1.5. Storing images and construction of reports

## **Training in the related discipline of anaesthesia**

Topics to be reviewed throughout the training program and techniques to gain practical experience with include but are not limited to the following as they apply to critically ill or emergency patient:

1. Pain management
  - 1.1. Prevention and control of pain: pre-emptive analgesia, post-operative analgesic techniques, management of acute (including post-operative) and chronic pain
  - 1.2. Use of multi-modal analgesic plans including combination therapy, CRIs, epidural analgesia, transdermal analgesia and local blocks.
  - 1.3. Drug actions and interactions, indications and contraindications, and potential adverse effects.
2. Anaesthesia
  - 1.1. Pre-operative assessment and patient preparation: pre-anaesthetic evaluation and premedication
  - 1.2. Equipment used in general anaesthesia delivery and monitoring
  - 1.3. Pharmacology of drugs used for sedation/ tranquilization, analgesia, muscle relaxation and anaesthesia. Drug action and interaction. The effect of drugs on gastrointestinal motility, the cardiovascular and respiratory systems.

- 1.4. Application of analgesic techniques before, during and after a surgical procedure and knowledge of their influence on the course of anaesthesia
- 1.5. Anaesthesia induction, maintenance and recovery techniques in small animals
- 1.6. Tranquilization and anaesthesia in small animals
- 1.7. Airway maintenance, oxygenation and ventilation, acute respiratory failure
- 1.8. Special anaesthetic considerations: anaesthesia of the neonate, geriatric patient, patient with systemic disease (eg. SIRS, septic shock), neurological, renal, liver or respiratory disease and the trauma patient. Anaesthesia of small animals with acute abdomen and other acute abdominal surgeries
- 1.9. Monitoring during anaesthesia, effects on the respiratory and CV systems and support of these systems during anaesthesia
- 1.10. Prevention and management of anaesthetic accidents and crises
- 1.11. Post anaesthetic complications including the prevention, diagnosis and management of post-anaesthetic lameness in small animals
- 1.12. Current techniques used during recovery from general anaesthesia
- 1.13. Local and regional anaesthesia techniques used in small animals including dental nerve blocks, epidural and spinal anaesthesia.

### **Training in the related discipline of veterinary neurology**

Topics to be reviewed throughout the training program and techniques to gain practical experience with include but are not limited to the following as they apply to critically ill or emergency patient:

1. The neurological examination
2. Diagnosis, support and treatment of central and peripheral neurological conditions including but not limited to head trauma, seizures, spinal injury, inflammatory brain disease, hepatic encephalopathy and neoplasia

### **Training in the related discipline of veterinary cardiology**

Topics to be reviewed throughout the training program and techniques to gain practical experience with include but are not limited to the following as they apply to critically ill or emergency patient:

1. Evaluation of the cardiovascular system using ultrasound, ECG, radiography, cardiac biomarkers and blood pressure measurement.
2. Support and treatment of cardiac conditions in emergency and critically ill patients including but not limited to dilated cardiomyopathy, cardiomyopathy in cats, valvular

disease, arrhythmias, congestive heart failure, pericardial effusion, systemic and pulmonary hypertension and feline arterial thromboembolism.

3. Interpretation of echocardiographic findings.

### **Training in the related discipline of veterinary clinical pathology**

The role of training in Clinical pathology is to provide guidance and training in pathology including the study and practice of current techniques used in tissue pathology and relevant aspects of microbiology, haematology, immunology and clinical chemistry as it applies to the critically ill and emergency patient.

Topics to be reviewed throughout the training program and techniques to gain practical experience will include but are not limited to the following as they apply to the critically ill and emergency patient.

1. A basic review of quality assurance and quality control to provide the candidate with an awareness of quality issues and procedures that reflect best practices for in-hospital testing and for commercial reference laboratories.
2. Basic knowledge of the time required to perform commonly requested tests and examinations.
3. An introduction to clinical pathology laboratory techniques including haematology, serum chemistry, cytology, urinalysis, abdominal and thoracic fluid analysis and aerobic and anaerobic culture techniques.
4. Review of common stains used for cytologic and histopathologic examination of samples.
5. Current techniques for the collection, transport, storage and preparation of a variety of surgical tissue biopsies.
6. Current techniques for the collection, transport, and storage of a variety of body fluids (including blood, peritoneal fluid and CSF) and aspirates for laboratory evaluation including cytology and culture.
7. Interpretation of laboratory results, understanding of pathologic and cytologic terminology and communication with the pathologist.

### **Training in the related discipline of veterinary ophthalmology**

Topics to be reviewed throughout the training program and techniques to gain practical experience with include but are not limited to the following as they apply to critically ill or emergency patient:

1. Ophthalmologic examination including fundic exam and tonometry.
2. Diagnosis and treatment of ophthalmologic conditions in emergency and critically ill patients including but not limited to blindness, glaucoma, lens luxations, uveitis,

hyphema, conjunctivitis, corneal ulceration, penetrating ocular trauma, proptosis and cataracts.

### **Training in the related discipline of veterinary oncology**

Topics to be reviewed throughout the training program and techniques to gain practical experience with include but are not limited to the following as they apply to critically ill or emergency patient:

1. Diagnostic techniques
2. Principles of treatment of neoplastic conditions in emergency and critically ill patients
3. Paraneoplastic syndromes
4. Adverse effects of chemotherapeutic drugs including neutropenia, gastrointestinal complications, organ failure and tumour lysis syndrome
5. Appropriate nursing considerations for animals receiving chemotherapeutic drugs including occupational health and safety concerns

### **Appendix 3: Clinical Skills Checklist**

This list is intended as a guide to the breadth of technical procedures that should be accomplished by the candidate. It is not exclusive. Completion of the procedures is not indicative of completion of Fellowship training.

#### **Vascular access techniques**

Blood sampling: venous and arterial  
Peripheral vein catheterisation  
Central vein catheterisation  
Arterial catheterisation  
Intraosseous catheterisation

#### **Cardiopulmonary Resuscitation (CPR)**

Closed chest CPR  
Open chest CPR

#### **Cardiovascular**

Echocardiogram  
Pericardiocentesis  
Blood pressure measurement: direct and indirect methods  
Central Venous Pressure measurement  
Cardiac catheter placement and cardiac output monitoring (PCWP; calculation of indices) or  
Lithium dilution cardiac output monitoring

#### **Respiratory**

Capnography (ETCO<sub>2</sub>)  
Pulse oximetry  
Oxygen supplementation  
Nebulization and coupage  
Thoracocentesis  
Thoracic drain placement and maintenance  
Thoracic lavage  
Continuous suction systems for thoracic drainage  
Bronchi-alveolar lavage, transtracheal wash  
Tracheal endoscopy  
Set up and maintenance of a patient on a ventilator  
Tracheostomy: placement and maintenance  
Thoracic ultrasound (T-FAST and VetBLUE techniques)

#### **Abdominal**

Abdominal ultrasound (FAST technique)  
Emergency abdominal surgeries as detailed in the learning outcomes  
Abdominocentesis, diagnostic peritoneal lavage  
Oesophageal and gastric endoscopy; foreign body retrieval  
Gastric lavage and enema  
Placement and management of peritoneal drainage devices



## **Urinary**

Cystocentesis  
Urethral catheterisation  
Cystostomy tube placement  
Placement of peritoneal dialysis catheter; peritoneal dialysis

## **Trauma management**

Bandage/Splint/Cast placement for limb support  
Closed reduction of luxated hip, elbow, shoulder  
Wound debridement  
Use of appropriate wound drainage techniques  
Laceration repair

## **Anaesthesia and analgesia**

Epidural anaesthesia/analgesia  
Intercostal nerve block  
Intrapleural analgesia  
Intravenous regional anaesthesia  
Balanced anaesthesia in the critical patient  
Low flow/closed circuit anaesthesia  
CRI analgesia  
Transdermal analgesia  
Intra-articular analgesia

## **Nutrition**

Placement and management of NG, oesophagostomy and gastrostomy tubes  
Management of jejunostomy tubes  
Calculation/formulation of TEN, PPN, CPN

## **Ophthalmologic**

Ophthalmic examination  
Measurement of intraocular pressure  
Third eyelid flap  
Enucleation  
Emergency tarsorrhaphy  
Subconjunctival flap  
Management of uveitis  
Management of glaucoma

## **Diagnostic Procedures**

Low dose dexamethasone suppression test  
ACTH stimulation test  
Activated clotting time measurement, APT, APTT  
Buccal mucosal bleeding time  
CSF tap  
Blood culture collection  
Bone marrow aspirate/biopsy  
Arthrocentesis

Cytological evaluation of:

Blood smears

Abdominal/thoracic fluid

### **Fluid and transfusion therapy**

Cross-matching

Blood typing

Whole blood collection

Set-up CRI administration of drugs

Blood component transfusion

### **Imaging**

Plain film radiographic procedures and interpretation

Horizontal beam radiography

Excretory Urography

Cystourethrogram

Myelogram

Barium swallow

Upper GI Barium series

Ultrasonographic detection of fluid in body cavities

Ultrasound guided aspirates

## **Appendix 4: Clinical Knowledge Checklist**

The following list of topics is included as an indicator of the depth and breadth of subjects to be discussed during training either informally with the supervisor or in formal seminars. It is not an exclusive list and is an adjunct to, not a replacement for, directly supervised clinical and technical training.

### **A. Anatomy, Physiology, Pathology and Therapy of Systems Derangements**

#### **1. Cardiovascular**

- a. Physiology
  - i. Mechanical cardiac cycle
  - ii. Determination of cardiac output: principles and techniques
    1. Wedge pressure measurements
    2. Lithium dilution
  - iii. Cardiac muscle function
  - iv. The action potential
  - v. Autonomic regulation
- b. Circulation
  - i. Local and systemic regulatory mechanisms
  - ii. Special regions: cerebral, coronary, renal splanchnic
- c. Cardiac arrhythmias and conduction disturbances
  - i. Mechanisms
  - ii. Cardiac pacing
- d. Cardiac tamponade and other acute pericardial diseases
- e. Acute valvular disorders
- f. Heartworm disease
- g. Microvasculature including the glycocalyx
- h. Current concepts of Starling's Law
- i. DO<sub>2</sub>/VO<sub>2</sub> concepts
- j. Recognition, evaluation and management of hypertension
  - i. Regulatory mechanisms
  - ii. Treatment
- k. ECG interpretation and application
- l. Blood pressure monitoring
- m. Auscultation
- n. CVP interpretation and application
- o. Pharmacology:
  - i. Anti-arrhythmics
  - ii. Inotropic agents
  - iii. Vasoactive drugs
- p. Oxygen balance: delivery and uptake
- q. Primary myocardial disease
  - i. Pathophysiology of CHF

- ii. Cardiomyopathy
- iii. Myocarditis
- r. Shock – hypovolaemic, distributive, cardiogenic, obstructive

## 2. Respiratory

- a. Physiology
  - i. Properties of gases
  - ii. Pulmonary volumes, Tidal volume measurement
  - iii. Work of breathing
  - iv. V/Q relationships
  - v. Compliance
  - vi. Control of breathing
  - vii. Gas exchange
- b. Lung anatomy
  - i. Pulmonary circulation
- c. Assessment of lung function
  - i. Auscultation
  - ii. Radiography
  - iii. A-a gradient
  - iv.  $CaO_2$
  - v.  $VO_2$ ,  $DO_2$
  - vi.  $CO_2$  transport
  - vii. Blood gases
  - viii. End tidal gases
- d. Airway management
  - i. Emergency airway management
  - ii. Endotracheal intubation
  - iii. Tracheostomy
- e. Ventilatory support techniques
  - i. Oxygen therapy
  - ii. Oxygen toxicity
  - iii. Mechanical ventilation
    - 1. Indications
    - 2. Modes
    - 3. Hazards
    - 4. Haemodynamic effects
    - 5. Weaning
- f. ALI/ARDS
  - i. Pathophysiology
  - ii. Diagnostic criteria (human and veterinary)
  - iii. Treatment
- g. Smoke inhalation, airway burns
- h. Drowning

- i. Aspiration or chemical pneumonitis
- j. Chest trauma
- k. Upper airway obstruction
  - i. Brachycephalic airway disease
  - ii. Laryngeal paralysis
  - iii. Foreign body, mass, oedema
- l. Infectious respiratory diseases
- m. Bronchial disease
- n. Pulmonary hypertension
- o. Pleural space disease
- p. Chest wall disease
- q. Diaphragm disease and injury
- r. Vascular disease – PTE
- s. Pulmonary oedema
  - i. Cardiogenic
  - ii. Non-cardiogenic
- t. Acute respiratory failure
- u. Pharmacology
  - i. Diuretics
  - ii. Bronchodilators; bronchoconstrictors

### 3. **Gastrointestinal**

- a. Physiology
  - i. Vascular supply to GI tract
  - ii. Motility
  - iii. Endothelial physiology
  - iv. Hormonal factors
- b. Role in shock
- c. Upper GI bleeding
- d. Lower GI bleeding
- e. Acute pancreatitis
- f. Megacolon
- g. Acute abdomen
  - i. Acute perforations of the GI tract
  - ii. Acute inflammatory diseases of the intestine
  - iii. Abdominal trauma, blunt and penetrating
  - iv. Gastric dilations – torsion
- h. Pancreas
  - i. Physiology
  - ii. Pancreatitis
  - iii. Diabetes mellitus
  - iv. Exocrine pancreatic insufficiency
- i. Liver

- i. Physiology
  - 1. Metabolism: glucose
  - 2. Vascular
  - 3. Hormonal
- ii. Drug clearance mechanisms
- iii. Acid-base balance
- iv. Role in shock
- v. Function in sepsis
- vi. Acute hepatic failure
- vii. Chronic hepatic failure
- viii. Cirrhosis
- ix. Hepatic encephalopathy
- x. Ruptured/fractured liver
- xi. Bile peritonitis
- xii. Infectious diseases including leptospirosis, hepatic abscess and infectious cholecystitis, biliary mucocoele
- j. Microbiology
- k. Pharmacology
  - i. Prokinetics
  - ii. Ulcer treatment/prophylaxis
  - iii. Anti-emetics
  - iv. Antibiotics
  - v. Coagulation support

#### **4. Urinary**

- a. Physiology
  - i. Circulation
  - ii. GFR
  - iii. Tubular function
- b. Renal regulation of fluid balance and electrolytes
  - i. Fluid balance
  - ii. Sodium and potassium balance
  - iii. Derangements secondary to alterations in osmolality and electrolytes
  - iv. Acid-base derangements
- c. Renal failure:
  - i. Oliguria
  - ii. AKI - pathophysiology and treatment
  - iii. CKD – factors and response
  - iv. Prerenal, renal, postrenal
- d. Dialysis
  - i. Peritoneal
  - ii. Haemodialysis
  - iii. Continuous renal replacement therapy

- e. Urinary tract obstruction
- f. Drug clearance
- g. Role of lower tract in barrier protection
- h. Control of micturition
- i. Pharmacology

#### **5. Reproductive Disorders**

- a. Eclampsia
- b. Dystocia
- c. Prostatic abscess
- d. Prostatitis
- e. Paraphimosis
- f. Penile trauma
- g. Orchitis/testicular torsion
- h. Pyometra, metritis
- i. Mastitis
- j. Postpartum haemorrhage
- k. Neonates

#### **6. Metabolic/Endocrine**

- a. Disorders of thyroid function
- b. Disorders of pituitary function
- c. Disorders of adrenal gland function
- d. RAAS
- e. Glucose metabolism
  - i. Diabetes mellitus
  - ii. Hyperosmolar hyperglycaemic crisis
  - iii. Ketoacidosis
  - iv. Hypoglycaemia
  - v. Insulinoma
- f. Disorders of calcium balance/parathyroid disease
- g. Disorders of magnesium balance

#### **7. Nutrition**

- a. Evaluation of requirements
  - i. Essential components of nutrition
  - ii. Nutritional requirements in critical illness
- b. Metabolism of carbohydrates, fat protein
- c. Starvation
  - i. Simple
  - ii. Stress
- d. Feeding options and techniques
  - i. Enteral
  - ii. Parenteral

- e. Complications of feeding
  - i. Metabolic including refeeding syndrome
  - ii. Mechanical



## **8. Haemo-lymphatic**

- a. Acute defects in haemostasis
  - i. Haemostasis in inflammation and sepsis
  - ii. Hypercoagulable states
- b. The roles of the endothelium:
  - i. Coagulation
  - ii. Inflammation
  - iii. Vascular tone
- c. Anaemia
- d. Thrombocytopenia
- e. Neutropenia
- f. Disseminated intravascular coagulation
- g. Toxic coagulopathies
- h. Mechanism of immune-mediated disease: haemolytic anaemia, thrombocytopenia
- i. Anaphylaxis

## **9. Infectious Diseases**

- a. Infectious diseases and management including prophylaxis
  - i. Mechanisms of disease – host response
  - ii. Sites of entry
- b. Antibiotics
  - i. MOA
  - ii. Indications
  - iii. Spectrum of activity
  - iv. Adverse effects
- c. Bacterial resistance
  - i. Mechanisms
  - ii. Strategies to decrease
- d. Antifungals,
- e. Antiviral
- f. Microbiology:
  - i. Fungi
  - ii. Yeasts
  - iii. Gram +ve and –ve bacteria
  - iv. Aerobic and Anaerobic infections
  - v. Viruses
- g. Nosocomial infections

## 10. Neurologic

- a. The brain:
  - i. Circulation
    - 1. Anatomy
    - 2. Blood brain barrier
    - 3. Regulation of cerebral perfusion
  - ii. CSF dynamics
  - iii. Intracranial pressure
  - iv. EEG
  - v. Clinical evaluation of activity level
    - 1. Modified Glasgow Coma Score
  - vi. Metabolism and energy requirements
  - vii. Trauma:
    - 1. Pathophysiology of primary brain injury
    - 2. Pathophysiology of secondary brain injury
    - 3. Treatment
  - viii. Infectious diseases
  - ix. Mass lesions
  - x. Drug ingestion
  - xi. Seizures
    - 1. Aetiology
    - 2. Treatment
- b. Spinal cord
  - i. Response to injury
  - ii. Mechanisms of neural transmission
  - iii. Pain modulation
- c. Idiopathic vestibular syndrome
- d. Peripheral NS
  - i. Nerve excitation and conduction
    - 1. Synaptic transmission
    - 2. Reflexes
  - ii. Neural injury
  - iii. Pain, the transmission of pain
  - iv. Neuromuscular disease
    - 1. Guillian Barre,
    - 2. Polyradiculoneuritis
    - 3. Tick paralysis
    - 4. Snake envenomation
    - 5. Botulism
    - 6. Myasthenia gravis
  - v. Electrodiagnostics

## **11. Musculoskeletal**

- a. Skeletal and smooth muscle contraction
- b. Initial management of closed and open fractures
- c. Crush injury
- d. Tendon repair

## **12. Oculo-Otic**

- a. Management and/or repair of ocular problems anterior to the iris
  - i. Corneal ulcer
  - ii. Eyelid laceration
  - iii. Corneal laceration
  - iv. Hyphaema
  - v. Horner's syndrome
  - vi. Acute glaucoma
- b. Management and/or repair of acute otic conditions
  - i. Otitis media
  - ii. Foreign body

## **13. Wound management**

- a. Skin trauma
- b. Principles of wound management
- c. Burns
- d. Open fractures

## **14. Coagulation/Transfusion Medicine**

- a. Normal coagulation (both traditional and cell based model)
- b. Interplay between inflammation and coagulation
- c. Laboratory testing including TEG, ROTEM, platelet function tests
- d. Haemoglobin physiology
- e. Platelet function
- f. Coagulopathies
  - i. DIC
  - ii. Thrombocytopenia/pathia
  - iii. Factor deficiencies
- g. Endogenous anticoagulants
- h. Procoagulant therapy
- i. Anticoagulant therapies
- j. Thrombolytic therapy
- k. Transfusion practices
- l. Artificial haemoglobin solutions

## **15. Prehospital/Admission – Triage**

- a. Facility set up
- b. Organisation
- c. Emergency drugs/supplies
- d. Primary telephone contact
- e. Client communication
- f. Hospital transport
- g. Primary survey
- h. Secondary survey

## **16. Resuscitation**

- a. Airway
- b. Breathing
- c. Control of acute bleeding/blood loss
- d. Cardiovascular support
- e. Vascular access techniques
- f. Fluids
- g. Emergency drugs
- h. Monitoring
- i. Thermal support

## **17. Primary Support Techniques**

- a. Fluids
- b. Oxygen administration techniques and flow rates
- c. Cardiac support
  - i. Inotropic drugs
  - ii. Vasoactive agents
  - iii. Antiarrhythmics

## **18. Toxins:**

- a. Principles of treatment: supportive care, decontamination, antidotes
- b. MOA, clinical signs, treatment
- c. Specific toxins (Non-exclusive):
  - i. Plants: lily, cycads,
  - ii. Snail baits: metaldehyde, methiocarb, iron
  - iii. Insecticides: ivermectin, avermectins, pyrethroids
  - iv. Organophosphate toxicities: acute, chronic, intermediate
  - v. Strychnine
  - vi. 1080
  - vii. PAPP: Para-aminopropiophenone
  - viii. Heavy metal: Lead, zinc
  - ix. Envenomations: snake, tick, toad, tetrodotoxin, lactrodetes

- x. Drugs: serotonin syndrome, illicit drugs, non-steroidal anti-inflammatories, paracetamol
- xi. Household poisons
- xii. Gaseous: CO
- xiii. Food: Chocolate, raisins/grapes, macadamia nuts, xylitol, onions
- xiv. Rodenticides: anticoagulant, cholecalciferol

## 19. Pharmacology

Candidates should be familiar with the dose, indications, contraindications and drug interactions of drugs used in the management of the emergency and critically ill patient. The following list is intended to give a broad view of the categories of drugs that maybe covered. Specific drugs have not been listed.

1. Pharmacokinetics and factors in efficacy
2. Antibiotics
  - 2.1. MOA
  - 2.2. Spectrum
  - 2.3. Antibiotics of preference for certain organisms/locations
3. Antifungals
4. Antiviral
5. Antineoplastics
6. Metabolic/endocrine
  - 6.1. Corticosteroids
  - 6.2. Insulin
  - 6.3. Thyroid hormones
7. Ophthalmologic drugs
8. Anti-inflammatory
  - 8.1. NSAID
  - 8.2. Corticosteroids
9. Immunosuppressive
10. Fluids/colloids
11. Cardiovascular medications
  - 11.1. Inotropic agents
  - 11.2. Vasopressors
  - 11.3. Vasodilators
  - 11.4. Diuretics
  - 11.5. Antiarrhythmics
12. Respiratory medications
13. GI medications
  - 13.1. Prokinetics
  - 13.2. Antiemetics
  - 13.3. Anti-ulcer medications
14. Hepatic medications
15. Renal medications
  - 15.1. Consequences of reduced renal function on drugs used in therapy

- 16. CNS medications
  - 16.1. Mannitol
  - 16.2. Anticonvulsants
  - 16.3. Sedatives – hypnotics
  - 16.4. Tranquillisers
  - 16.5. Anaesthetics
- 17. Analgesics
- 18. Neuromuscular blockers

## **20. Fluid balance/therapy**

- a. Physiology
  - i. Cell membrane integrity
  - ii. Cell membrane pumps/transport mechanisms
  - iii. Osmolality
  - iv. Oncotic pressure
- b. Crystalloids
- c. Colloids
- d. Acid-base physiology/pathophysiology
- e. Electrolytes
- f. Glycocalyx

## **21. Oncologic emergencies**

- a. Pre-treatment
- b. Post-treatment

## **22. Surgery**

- a. Materials and suture patterns
- b. Principles of asepsis
- c. Surgical approaches to the chest, including:
  - i. Lung lobectomy
  - ii. Open-chest CPR
  - iii. Closure of the thoracic cavity
- d. Surgical approaches to the abdomen, including:
  - i. Exploratory laparotomy
  - ii. Open abdomen
  - iii. GDV
  - iv. Gastrectomy
  - v. Caesarian
  - vi. Enterotomy/enterectomy
  - vii. Pyometra ovariohysterectomy
  - viii. Diaphragmatic hernia
  - ix. Splenectomy
  - x. Liver lobectomy

xi. Cystotomy

## **B. Management of Global Problems**

There are some emergency and critical care conditions that do not fit easily into any body systems category. The pathophysiology, diagnosis and treatment of these conditions is within the scope of this examination. The conditions include:

1. Hypothermia
2. Heat stroke/thermal injury
3. Fever of unknown origin
  - a. Approach
  - b. Pathophysiology
4. Shock
5. Sepsis/SIRS
  - a. Endothelial physiology
  - b. Inflammatory mediators
  - c. Coagulation
    - i. Platelets
    - ii. Disseminated intravascular coagulation
    - iii. Pro-coagulant changes
6. Multiple Organ Dysfunction
7. Cardiopulmonary arrest
8. Trauma: Initial approach to the management of multisystem trauma.

## **C. Assessment of the Emergency and ICU Patient**

Candidates should be able to prioritise a patient's problems based upon principles of triage. Assessment includes usage of history, physical examination findings, clinical pathology, radiology/ultrasound and electrocardiograms and scoring systems where relevant i.e. modified Glasgow coma scale, acute patient physiological and laboratory (APPLE), animal trauma triage scoring systems.

## **Diagnostics and monitoring**

1. Haemogram or components thereof
2. Chemistry profile or components thereof
3. Electrolytes
4. Blood gases
5. Urine analysis
6. Coagulation profiles – ACT, PT, APTT, platelet counts
7. Radiography/contrast procedures
8. Ultrasound
9. Echocardiography
10. Colour flow Doppler
11. Cardiac catheterisation

## **E. Management of Anaesthesia and Analgesia**

Candidates should be familiar with the principles of anaesthesia and analgesia as they apply to the emergency or critically ill patient. It is necessary to understand the concepts of balanced anaesthesia, use of opioids and management of anaesthetic emergencies.



**Appendix 5 – Template for Recording of Teaching Requirements**

Fellowship Candidate Name:

Subject: Veterinary Emergency and Critical Care

Date of Submission:

Formal Lectures				
Date	Title/Topic	Location	Length	Role of Candidate

Laboratory/Clinical Teaching				
Date	Title/Topic	Location	Length	Role of Candidate

## Appendix 6 – Template for Recording of Seminars

Fellowship Candidate Name:

Subject: Veterinary Emergency and Critical Care

Date of Submission:

Date	Title/Topic	Location	Type of Activity	Specialist in Attendance	Length (h)
Example: 9/8/2019	Intravenous lipid therapy for toxicities	Best Vet Hospital	Journal Club	Mary Jane (FANZCVS ECC)	1.5
				Subtotal for Page	1.5
				Total Seminar Hours	1.5

