Second Edition

Advanced Monitoring and Procedures for Small Animal Emergency and Critical Care

Edited By

Jamie M. Burkitt Creedon

Harold Davis

with website

WILEY Blackwell

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WILEY Blackwell

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Contents

List of Contributors *xi*
Preface to the Second Edition *xvii*
Acknowledgments *xix*
About the Companion Website *xxi*

Section One Fundamental Elements of Emergency and Critical Care Practice *1*

1 **Triage** *3*
Harold Davis

2 **The Small Animal Emergency Room** *13*
Martin D. Miller and Sean D. Smarick

3 **Intensive Care Unit Design** *23*
Joris H. Robben and Lindsey Dodd

4 **Developing and Using Checklists in Practice** *47*
Elizabeth B. Davidow and Carmen King

5 **Medical Charting** *53*
Karl E. Jandrey and Sharon Fornes

6 **Point-of-Care Ultrasound for Emergency and Critical Care** *75*
Søren Boysen and Valerie Madden

Section Two Cardiovascular Procedures and Monitoring *81*

7 **Catheterization of the Venous Compartment** *83*
Andrea M. Steele and Jessica L. Oram

8 **Arterial Puncture and Catheterization** *103*
Elisa M. Mazzaferro and Nicole van Sant

9 **Ultrasound-Guided Vascular Access** *117*
Søren Boysen and Valerie Madden

10 **Principles of Electrocardiography** *127*
Jamie M. Burkitt Creedon

11 **Electrocardiogram Interpretation** *135*
Casey J. Kohen

12 **Fluid-Filled Hemodynamic Monitoring Systems** *153*
Jamie M. Burkitt Creedon

13 **Direct Systemic Arterial Blood Pressure Monitoring** *169*
Edward Cooper and Stacey Cooper

14 **Noninvasive Arterial Blood Pressure Monitoring** *181*
Christopher L. Norkus and Nicholas L. Rivituso

15 **Central Venous Pressure Monitoring** *191*
Rosalind S. Chow

16 **Cardiac Output Monitoring** *207*
Mack Fudge

17 **Point-of-Care Cardiac Ultrasound** *225*
Valerie Madden and Søren Boysen

18 **Pericardiocentesis** *241*
Simon P. Hagley

19 **Monitoring Tissue Perfusion: Clinicopathologic Aids and Advanced Techniques** *251*
Alexandra Nectoux and Guillaume L. Hoareau

20 **Cardiopulmonary Resuscitation** *261*
Sean D. Smarick

21 **Open-Chest Cardiopulmonary Resuscitation** *271*
Janelle R. Wierenga and Katherine R. Crosse

22 **Defibrillation** *281*
Casey J. Kohen

23 **Temporary Cardiac Pacing** *291*
Anna Grimes and H. Edward Durham, Jr

Section Three Respiratory Procedures and Monitoring *309*

24 **Oxygen Therapy** *311*
Kate Farrell

25 **Pulse Oximetry and Co-Oximetry** *327*
Kate Farrell

26 **Blood Gas Analysis** *339*
Sarah Gray

27 **Point-of-Care Lung and Pleural Space Ultrasound** *347*
Søren Boysen and Valerie Madden

28 **Tracheal Intubation** *365*
Marc Raffe and Rachel Bassett

29 **Temporary Tracheostomy** *377*
F. A. (Tony) Mann

30 **Capnography** *389*
Linda S. Barter and Alessia Cenani

31 **Mechanical Ventilation** *399*
Kate Hopper and Julie Eveland-Baker

32 **Ventilator Waveform Analysis** *409*
Deborah Silverstein and Justina Gerard

33 **Alternative Methods of Augmented Ventilation** *427*
Jessica Schavone and Elizabeth Rozanski

34 **Pleural Space Drainage** *431*
Amanda Arrowood and Lori S. Waddell

Section Four Urinary and Gastrointestinal Procedures *449*

35 **Urethral Catheterization** *451*
Jamie M. Burkitt Creedon

36 **Peritoneal Dialysis** *467*
Michael D. Santasieri, Carolyn Tai, and Mary Anna Labato

37 **Technical Management of Hemodialysis** *481*
Karen Poeppel and Cathy Langston

38 **Peritoneal Evaluation** *499*
Laura Osborne and Lindsey Strang

39 **Point-of-Care Abdominal Ultrasound** *513*
Søren Boysen and Valerie Madden

40 **Specialized Gastrointestinal Techniques** *523*
Lisa Smart and Joyce Lau

41 **Postoperative Peritoneal Drainage Techniques** *539*
Margo Mehl

Section Five Nutrition *545*

42 **Nutritional Requirements in Critical Illness** *547*
Daniel L. Chan

43 **Enteral Diets for Critically Ill Patients** *555*
Sally C. Perea

44 **Assisted Enteral Feeding** *567*
Wan K. A. Tan

45 **Parenteral Nutrition** *585*
Jennifer Larsen

Section Six Analgesia and Anesthesia *599*

46 **Drug Administration** *601*
Damion Asselin and Jane Quandt

47 **Pain Recognition and Management** *617*
Chiara Valtolina and Liza Lindeman

48 **Systemic Analgesia** *631*
Sarah Haldane and Angela Chapman

49 **Local Anesthesia** *651*
Christopher L. Norkus

50 **Monitoring the Anesthetized Patient** *665*
Benjamin M. Brainard and Jessica Perlini

51 **Nursing Care of the Long-Term Anesthetized Patient** *681*
Yekaterina Buriko and Bridget M. Lyons

52 **Neuromuscular Blockade** *691*
Manuel Martin-Flores and Karen L. Basher

Section Seven Clinicopathologic Techniques *699*

53 **Blood Sample Collection and Handling** *701*
Courtney Waxman and Tami Lind

54 **In-House Hematologic Evaluation** *717*
Karl Jandrey and Andrew Burton

55 **In-House Evaluation of Hemostasis** *739*
April Summers, Jocey Pronko, and Julien Guillaumin

56 **Electrolyte Evaluation** *747*
Louisa J. Rahilly and Katherine Vachon

57 **Acid–Base Evaluation** *763*
Kate Hopper

58 **Osmolality and Colloid Osmotic Pressure** *771*
Elke Rudloff and Angel Rivera

59 **Body Fluid Collection and Handling** *779*
Adesola Odunayo and Eric Hilton

60 **Urinalysis in Acutely and Critically Ill Dogs and Cats** *787*
Lucy Kopecny and Sean Naylor

61 **Cytology** *797*
Rebecca J. Greer

Section Eight Infection Control *807*

62 **Minimizing Healthcare-Associated Infections** *809*
Jane E. Sykes

63 **Care of Indwelling Device Insertion Sites** *819*
Helen Philp

64 **Antiseptics, Disinfectants, and Sterilization** *837*
Samantha Jones, Krystle Reagan, and Nicole Saunders

65 **Personnel Precautions for Patients with Zoonotic Disease** *845*
Sarah Fritz and Christopher G. Byers

Section Nine Transfusion Medicine *859*

66 **Blood Typing and Crossmatching** *861*
Sarah Musulin and Kenichiro Yagi

67 **Blood Transfusion** *879*
Julien Guillaumin and Kristin Kofron

68 **Administration of Other Biological Products** *891*
Jennifer E. Prittie and Jasmine De Stefano

69 **Blood Banking** *905*
Marie K. Holowaychuk and Kenichiro Yagi

Section Ten Nursing Care of Specific Populations *921*

70 **Care of the Patient with Intracranial Disease** *923*
Marie K. Holowaychuk and Charlotte E. Donohoe

71 **Care of the Burned Animal** *935*
Steven Epstein

72 **Care of the Environmentally Injured Animal** *941*
Michael S. Lagutchik, Rufus W. Frederick, and James O. Barclay

73 **Blood Glucose Monitoring and Glycemic Control** *951*
Erica L. Reineke

74 **Critical Nursing Care of the Neonate** *965*
Autumn Davidson and Janice Cain

75 **Safe Handling and Care of Patients Exposed to Radioactive and Anti-Neoplastic Agents** *997*
Michael S. Kent and Kristen Sears

76 **Handling the Suspected Cruelty Case** *1005*
Alison Liu

Section Eleven Wellness for the Veterinary Health Care Team *1017*

77 **Self-Compassion: The Cornerstone of Wellbeing** *1019*
Deborah A. Stone

Index *1027*

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Preface to the Second Edition

The discipline of small animal emergency and critical care medicine continues to advance and evolve. It has been 11 years since publication of the first edition of our textbook, and we believe that this new edition will help update our community on the monitoring and procedural aspects of care. Our focus continues to be the core, daily hands-on practice of the specialty. This edition features returning and new authors updating previous chapters, and returning and new authors providing additional chapters. We are excited about these additional chapters – among others, they include a comprehensive review of point-of-care ultrasound, an extensive discussion on nursing care of neonates, and the unique and important considerations for handling suspected cruelty cases. We continue to believe the veterinary community benefits from a single reference written by informed, experienced people to improve and expand the standard of care, and we hope this textbook continues to serve that purpose as the first edition did.

Emergency and critical care practice is a team sport that requires cooperation among all its members. Thus, some chapters are authored by a veterinarian, others by a veterinary technician, and some by pairs or groups. The interdependence of all members of the ECC healthcare team requires that veterinary technicians understand why clinicians do what they do, and that veterinarians understand proper ECC nursing care and technical procedures. The collective knowledge and skills of the team fosters a proactive rather than reactive approach to each shift's challenges. The book's contributors come from around the world, from both university and private practice. We aimed to provide the best-referenced, highest-quality textbook that we could. Contributors congenially answered our frequent "Do you have a reference for this?" inquiries and high-quality image requests, so that the reader could have confidence in the recommendations contained herein and see illustrations of how to perform procedures or interpret results. When high-quality references or guidelines were unavailable, these qualified authors made recommendations based on their experience; in such cases, such personal recommendation is noted in the text for transparency.

The textbook is organized roughly by organ system or general topic, but there is considerable overlap in some areas. For instance, some authors of device insertion chapters included a maintenance section, and maintenance of that device may also be covered in another chapter specifically on insertion site maintenance, and so on. Standardized protocols are included for procedures for which they were deemed useful. These protocols are based on best-available evidence and guidelines, and where such citations were unavailable, they are based on author experience. We hope that these protocols will continue to help raise and equalize the standard of care across our profession and serve as the backbone for a protocol book to use in your practice.

We welcome corrections and ideas for future versions of this textbook. Should further editions follow, we are committed to their currency and relevancy, and thus will continue to push for best-practice, evidence- and guideline-based recommendations. We are grateful to the previous contributors, some of whom are now deceased, as their contributions often served as the framework for chapters included here. Finally, we would like to thank each current contributor; they did an amazing job stepping up to the challenges that this unique textbook posed in this unprecedented time in our world and our industry.

Jamie M. Burkitt Creedon
Harold Davis

Acknowledgments

To all the lifelong learners in our profession doing this job out there, thank you for your continual efforts to grow and improve for the sake of our teams and our patients.

To the generous, patient, kind people I am so fortunate to call my friends, you make my days better and I am grateful for you.

And most of all to my family, who remind me every day of what is most important – you are my sunshine and I love you.

"We have two lives, and the second begins when we realize we only have one." – *Confucius*

May you all be on Life Two. *Jamie*

Thank you to all the veterinary health care professionals for all you do to care for our patients, I trust this text will aid you in that endeavor.

To my friends and colleagues, I appreciate your friendship, support, and the fact that you challenge me to be better every day.

To my parents, sister, and extended family this is for you; your love, support and guidance have made this possible and all worthwhile. *Harold*

About the Companion Website

This book is accompanied by a companion website.

www.wiley.com/go/burkitt/monitoring 

This website includes:

- Figures from the book available to download in Microsoft PowerPoint
- Videos
- Protocols from the book

Section One

Fundamental Elements of Emergency and Critical Care Practice

1

Triage

Harold Davis

The word "triage" comes from the French verb trier, meaning to sort. The concept of triage finds its origin in the military, and the goals of triage in human medicine have varied over the years depending upon the situation. After World War II triage came to mean the process of identifying those soldiers most likely to return to battle after medical care. During the Korean and Vietnam conflicts the goals of triage came to mean the greatest good for the greatest number of wounded [1]. In times of disaster, the goals of triage are like those of the military: to concentrate effort and resources on saving the largest number of people possible. Daily human emergency room triage began in the 1960s and has evolved into a method to separate efficiently those patients stable enough to wait for treatment from those who require immediate medical attention. In veterinary medicine we have adopted the goals of our counterparts in the human emergency room. Thus, we prioritize cases by medical urgency when presented with multiple emergencies at the same time.

Triage occurs both by telephone and in the hospital. A client often calls the hospital seeking advice for the care of their pet; the receptionist or veterinary technician must ascertain useful information about the pet in a short period of time. Thus, the receptionist or technician should have the knowledge required to provide appropriate advice. The information obtained during the telephone conversation will also be useful in preparing for patient arrival. On initial presentation to the hospital the veterinary technician is usually first to receive the patient and therefore to perform basic triage. This person must determine whether the patient needs immediate care and, in the case of simultaneous patient arrivals, prioritize treatment based on medical need.

Telephone Triage

In theory, telephone triage requires clinic staff to determine the urgency of a pet's problem and to provide advice based on that determination. However, because the client may not possess the training to give an accurate account of the pet's problem(s), it is generally safest to recommend that the client take the pet to a veterinarian for evaluation. Particularly any patient experiencing breathing difficulty, seizures, inability or unwillingness to rise, or traumatic injury should be seen by a veterinarian without question.

At the beginning of the telephone conversation, staff should establish the animal's signalment (breed, sex, age, and approximate weight) if possible. Questions asked of the owner should be basic and straightforward using lay terminology. Questions should address the patient's level of consciousness (LOC), whether the patient is breathing easily or with difficulty, has abnormal mucous membrane color, experiencing seizures, has obviously broken or exposed bones, or has any pre-existing medical conditions (Box 1.1). Based on the owner's responses, advice can be given on first aid, assuming that the problem can be clearly defined and is simple. See Box 1.2 for a list of problems requiring immediate attention by the veterinary healthcare team.

Information gathered during the phone conversation can aid the veterinary technician in preparation for the arrival of the patient at the hospital. Knowing the animal's breed or approximate weight allows the technician to pre-select appropriate sizes for vascular catheters, fluid bags, and endotracheal tubes.

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Box 1.1 Questions Useful in Telephone Triage, and Suggested Responses

1) Is the animal breathing and conscious?
   A) If neither, institute chest compressions and mouth-to-snout; if yes to either of these, do not.
2) Is the animal having difficulty breathing?
   A) If yes, take immediately to a veterinarian.
3) What color are the mucous membranes (gums)? Do they appear their usual color?
   A) If no, what color is noted?
4) Is the animal actively experiencing a seizure?
   A) If yes, remove from danger of falling, bodies of water, or sharp objects. Take to veterinarian immediately after seizure ends, or if it lasts longer than 1–2 minutes, bring during seizure. Instruct owners to stay clear of the animal's mouth to avoid accidental bite wounds.
5) Has the animal ingested something that may be poisonous within the last two hours?
   A) If yes, take immediately to a veterinarian. In some situations, if the client cannot or will not take the pet immediately to a veterinarian, at-home emesis may be recommended.
6) Is there active bleeding, an obvious fracture, or exposed bone?
   A) Recommend clean towel over the site, pressure if spurting blood. Warn clients to be VERY CAREFUL to avoid being bitten.
7) Does the animal have any ongoing medical problems and or is it on any medications (including over the counter)?
   A) Briefly restate your understanding of the problem(s). If on medications and coming into the hospital, instruct the owner to bring all medications.

Box 1.2 Problems Requiring Immediate Attention by the veterinary healthcare team

- Cardiopulmonary arrest (unconscious and making no regular attempts to breathe)
- Excessive bleeding
- Respiratory distress
- Weakness
- Pale mucous membranes
- Rapid abdominal distension
- Neurological abnormalities
- Inability or persistent straining to urinate
- Protracted vomiting
- Ingestion or topical exposure to toxins
- Burns
- Snake envenomation
- Perforation, wound dehiscence, or open body cavities
- Open fractures
- Prolapsed organs
- Dystocia

Owners should be instructed on safe transport of the animal. Animals that have suffered trauma are often in pain, and owners should be coached on how to approach the pet and place a makeshift muzzle using a necktie, belt, or strips of cloth. If the animal is nonambulatory, owners may be told to place the animal in a box or carrier, or to use a blanket or towel as a stretcher (Figure 1.1). The use of a blanket stretcher makes it easier to get an animal in and out of a car. If the animal is a cat, it should be brought in a cat carrier or box (with holes).

When the caller is not a regular client of the facility, the staff member should obtain the client's phone number early in the conversation in case of disconnection and make the caller aware of the address, location, or easiest directions to the clinic. The client should be informed of the clinic's payment policy.

Finally, the telephone conversation should be documented, giving a complete summary of what transpired. Logs are saved for whatever period is dictated by the regulating body. Telephone logs serve as an extension of the legal medical record.

Hospital Triage

Three major body systems are assessed during the initial triage: respiratory, cardiovascular, and neurological. Triage begins when approaching the patient. Visually assess breathing effort and pattern; presence of blood or other foreign material on or around the patient; and the patient's posture and LOC. Note if there are airway sounds audible without a stethoscope. Note whether the animal responds as you approach. If the animal is conscious, ask the owner about the patient's temperament and take the appropriate precautions regarding physical restraint or muzzling. The veterinary technician cannot rely on the client's statement that an animal "never bites," but if the client states that the patient is aggressive, the patient should be muzzled. Physical restraint and muzzling should be performed with extreme caution in patients with respiratory distress, as such steps can cause acute decompensation and respiratory arrest. If time permits, a brief history should be obtained.

Figure 1.1 (a) Placing a dog in a box for transport. (b) Using a blanket as a stretcher. The animal is placed on a blanket and the edges of the blanket used to lift the patient.

The ABCDEs

A reasonable and systematic approach to triage is the use of the ABCDEs of emergency care, which are: (A) airway, (B) breathing, (C) circulation, (D) dysfunction of the central nervous system, and (E) exposure/examination (Figure 1.2). Patients with respiratory distress or arrest, signs of hypovolemic shock or cardiac arrest, altered LOC, or ongoing seizure activity should be immediately taken to the treatment area for rapid medical attention. Conditions that affect other body systems are generally not life-threatening in and of themselves, but their effects on the three major body systems may be life-threatening. For example, a fractured femur bleeding into a limb can lead to life-threatening hypovolemia.

Airway and Breathing

Expedient respiratory system assessment and rapid correction of abnormalities are critical. First, patency of airway and breathing effort should be assessed. This is done by visualization, auscultation, and palpation. When looking at the animal, an experienced individual can determine whether the animal has increased breathing rate or effort. Some animals with respiratory distress may assume a posture with the head and neck extended and the elbows abducted (held away from the body). Additional concerning signs include absent chest wall motion, exaggerated breathing effort, flaring of the nares, and open mouth breathing in cats. A "paradoxical" breathing pattern can occur when sustained high breathing effort leads to respiratory fatigue or during upper airway obstruction; paradoxical breathing is characterized by opposing movements of the chest and abdominal walls during inspiration and expiration. Cyanosis, a blue or purplish tint to the mucous membranes, usually indicates hypoxemia and warrants immediate medical intervention. The chest wall may be palpated to assess chest wall integrity. Crepitus about the body may indicate subcutaneous emphysema, which can be caused by tracheal tears or chest wall defects.

Assessment questions the triage technician should consider include:

- Is the patient having difficulty breathing?
- Are breath sounds audible?
- Are facial injuries interfering with the airway?
- Has a bite wound disrupted the larynx or trachea?
- Is subcutaneous emphysema present?
- What color are the mucous membranes?
- Does respiratory distress get worse with patient position change?
- Is there evidence of thoracic penetration or an unstable chest wall segment?

Circulation

Many of the signs suggestive of decreased cardiac output are a result of a compensatory sympathetic reflex, which helps maintain arterial blood pressure. Clinical signs suggestive of decreased cardiac output include tachycardia, pale or gray mucous membranes, prolonged capillary refill time, poor pulse quality, cool extremities, and decreased mentation. Decreased cardiac output may be due to hypovolemia from blood or other fluid loss (internally or externally; active or historical), trauma, or cardiac disease.

Circulation is assessed by visualization, palpation, and auscultation if using a stethoscope. The focus of the cardiovascular assessment is the six perfusion parameters (Box 1.3).

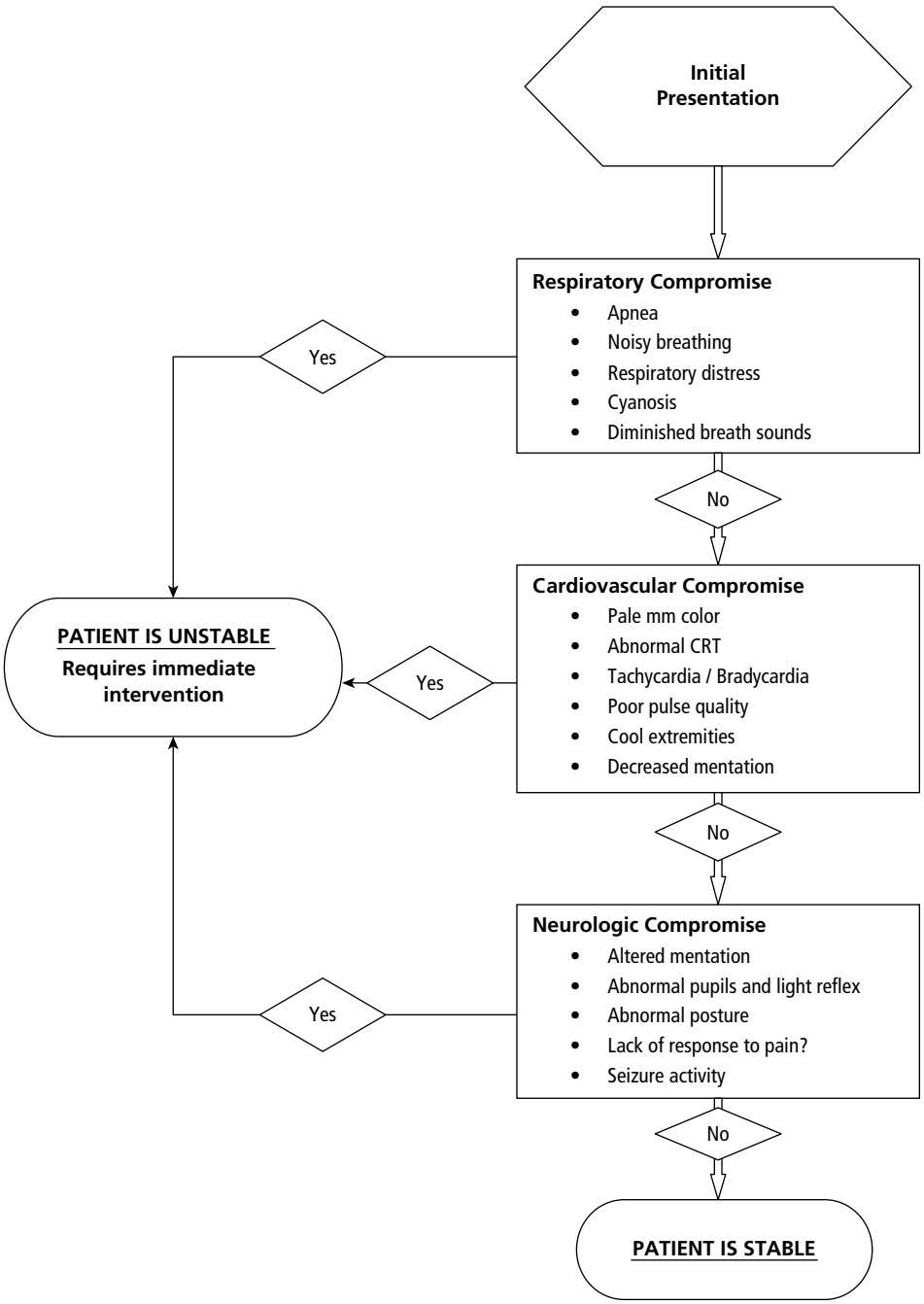

Figure 1.2 Triage algorithm. CRT, capillary refill time; mm, mucous membranes.

Box 1.3 The Six Perfusion Parameters

- Mentation
- Mucous membrane color
- Capillary refill time
- Heart rate
- Pulse quality
- Extremity temperature

Mentation

As previously mentioned, evaluation of mentation starts from afar. The patient's attitude is evaluated without stimulation. A reduced level of mentation is indicated by a loss of interest in the surrounding environment and diminished or absent responses to stimuli such as noise and touch. This can be described as obtundation or depression. As depression implies an assessment of the animal's emotional state, obtundation may be a more appropriate term.