VT-2610: VETERINARY ANESTHESIA, ANALGESIA, & DENTAL TECHNIQUES

Cuyahoga Community College

Viewing: VT-2610 : Veterinary Anesthesia, Analgesia, & Dental Techniques

Board of Trustees:
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Academic Term:
Fall 2025

Subject Code
VT - Veterinary Technology

Course Number:
2610

Title:
Veterinary Anesthesia, Analgesia, & Dental Techniques

Catalog Description:
Fundamentals of veterinary anesthesia and analgesia. Students learn how to induce, maintain, and monitor anesthesia, administer and assess response to analgesics, and perform routine veterinary dental cleaning procedures.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
3

Requisites

Prerequisite and Corequisite
VT-1600 Veterinary Surgical Nursing and Assisting, VT-2300 Pharmacology for Veterinary Technicians, and VT-2200 Dentistry for Veterinary Technicians.

Outcomes

Course Outcome(s):
Coordinate and integrate all aspects of anesthetic management in a variety of domestic animal species.

Objective(s):

1. Compare and contrast the terms local anesthesia, regional anesthesia, general anesthesia, neuroleptanalgesia, sedation, tranquilization, and balanced anesthesia.
2. Describe and implement the principles of endotracheal intubation in a variety of animal species including tube selection, placement, monitoring, and avoiding complications.
3. Monitor a patient’s physiologic status using physical and machine-generated parameters used to gauge circulation, oxygenation, ventilation, and anesthetic depth.
4. Monitor the recovery of a dog, cat, horse, or cow from anesthesia and differentiate normal from abnormal anesthetic recovery.
5. Describe a general anesthetic event in a horse or ruminant, including ways in which an anesthetic procedure in these species differs from that of a small animal patient.
6. Explain the principles of special anesthetic procedures including local and regional anesthesia, neuromuscular blockade, and manual and mechanical ventilation.
7. Recognize common anesthetic problems and emergencies, and describe the associated causes, interventions, and prevention.
8. Discuss the objectives of anesthesia and techniques used to achieve these objectives.
9. Coordinate each aspect of patient preparation for anesthesia including acquiring a minimum patient database, physical assessment, patient stabilization, and physical status classification.

10. Explain general ways in which anesthetics and adjuncts are used to sedate and anesthetize veterinary patients.
11. Prepare patients for local, regional, and general anesthetic procedures.
12. Manage patients during all aspects of an anesthetic procedure including induction, maintenance, and recovery.
13. List the sequence of events required to take a small animal patient from consciousness to surgical anesthesia and back to consciousness.
14. Induce and maintain general anesthesia in small animal patients by intramuscular (IM) injection, intravenous (IV) injection, mask or chamber, and constant rate infusion.

Course Outcome(s):

Administer anesthetics and adjuncts by common routes for local, regional, or general anesthetic procedures.

Objective(s):

1. List methods of classifying anesthetic agents and match classes with commonly used anesthetic agents in each class.
2. Describe the primary actions, effects, adverse effects, and properties of anesthetic agents including local anesthetics, anticholinergics, sedative/tranquilizers, opioids, injectable anesthetics, inhalant anesthetics, dissociatives, and anesthetic adjuncts.
3. Identify uses for, characteristics of, and principles for safe use of anesthetic agents and adjuncts.
4. Explain how the properties governing the action of inhalant anesthetics including vapor pressure, blood-gas partition coefficient, and minimum alveolar concentration affect the way these agents are used.
5. Perform anesthetic agent and adjunct dosage calculations.
6. Prepare, administer, and monitor responses to preanesthetic medications, general anesthetics, and anesthetic adjuncts given by a variety of routes.
7. Describe hazards associated with waste anesthetic gases and injectable agents and implement Occupational Health and Safety Administration (OSHA) standards to minimize these risks.

Course Outcome(s):

Select, operate, and maintain anesthetic delivery and monitoring instruments and equipment.

Objective(s):

1. Describe the characteristics of, use of, and maintenance of anesthetic equipment including endotracheal tubes, laryngoscopes, masks, and chambers.
2. Explain the structure, function, use, and maintenance of each component of an anesthetic machine including the oxygen supply, vaporizer, breathing circuit, and scavenging system.
3. Select, prepare, operate, and maintain anesthetic machines, breathing circuits, and associated equipment.
4. Calculate, select, and utilize appropriate oxygen flow rates and inhalant anesthetic settings for various animal species, breathing systems, and periods of an anesthetic procedure.
5. Identify and observe safety considerations when using veterinary anesthetic equipment including compressed gas cylinders and other oxygen sources.
6. Select, operate, and maintain ancillary anesthetic delivery equipment including chambers, masks, endotracheal tubes, laryngoscopes, and ventilators
7. Select, operate, and maintain anesthetic monitoring equipment including heart, respiratory, blood pressure, and oxygen monitors and interpret data generated by these instruments.

Course Outcome(s):

Coordinate and integrate all aspects of pain management in a variety of domestic animal species.

Objective(s):

1. Use common physiologic and behavioral signs to evaluate patients for pain.
2. Coordinate, provide, and monitor pre-, intra-, and post-operative pain management for a variety of animal species.
3. Describe the primary actions, effects, adverse effects, properties, and usage of analgesics including opioids, non-steroidal anti-inflammatory drugs (NSAIDs), local anesthetics, alpha2 agonists, andN-methyl-D-aspartate (NMDA) antagonists.
4. Compare and contrast acute, chronic, inflammatory, neuropathic, somatic, and visceral pain and hypersensitivity.
5. Describe and apply the principles of effective pain management including the concepts of pre-emptive and multimodal analgesia.

Course Outcome(s):

Coordinate and integrate all aspects of preventive and therapeutic dental cleaning and dental assisting procedures in small animal patients.

Objective(s):

1. Assess and prepare a patient for a therapeutic dental cleaning
2. Perform each step of a therapeutic dental cleaning using power and hand instrumentation, including supra and subgingival calculus removal, polishing, and client education.
3. Select, prepare, operate, and maintain hand and power equipment used to provide routine dental care.
4. Chart normal findings, dental pathology, and interventions using dental charting systems.

Methods of Evaluation:

1. Quizzes
2. Practical examinations
3. Unit examinations
4. Final examination
5. Participation
6. Skill assessments
7. Homework assignments

Course Content Outline:

1. Introduction to anesthesiology
    a. Indications for anesthesia
    b. Terminology of anesthesia
    c. Patient evaluation and preparation
        i. Acquisition of the minimum patient database (MPD)
        ii. Assigning a physical status classification
        iii. Preinduction patient care including fasting, stabilization, and fluid therapy
    d. Record keeping
        i. Controlled substance logs and anesthesia/surgery logs
        ii. Patient medical records
2. Workplace safety
    a. Dangers associated with exposure to waste anesthetic gases (WAGs)
        i. Regulation and monitoring of WAGs
        ii. Reducing risk
    b. Dangers associated with use of compressed gas cylinders
        i. Sudden release of gas
        ii. Fire and explosion
        iii. Torpedo effect
        iv. Handling compressed gas cylinders safely
    c. Dangers associated with injectable agents
        i. Injectable agents of concern
        ii. Handling agents used in the capture and restraint of wild animals
        iii. Preventing exposure
    d. Routes and methods of anesthetic administration
3. Anesthetic agents and adjuncts
    a. Classification of anesthetics and adjuncts
    b. Indications and uses
    c. Routes of administration
    d. Mode of action and pharmacology
    e. Chemical characteristics
    f. Effects and adverse effects
    g. Handling and administration
    h. Preanesthetic agents
        i. Anticholinergic agents
        ii. Sedatives/tranquilizers

1. Phenothiazines
2. Benzodiazepines
3. Alpha2-agonists
4. Reversal agents for sedatives/tranquilizers

iii. Opioids
1. Agonists
2. Partial agonists and agonist-antagonists
3. Antagonists
4. Neuroleptanalgesia

i. Injectable anestheticagents
i. Propofol
ii. Alfaxalone
iii. Etomidate
iv. Barbiturates

j. Dissociatives
k. Guaifenesin
l. Inhalation anesthetics
i. Physical and chemical properties
1. Vapor pressure
2. Partition coefficient
3. Minimum alveolar concentration (MAC)

ii. Halogenated organic compounds
1. Isoflurane, sevoflurane, and desflurane

iii. Nitrous oxide

4. Principles of endotracheal intubation
a. Reasons for use
b. Structure, function, and parts of endotracheal tubes
c. Laryngoscopes
d. Selecting and preparing the tube and patient
e. Placing the tube
f. Checking for placement and cuff inflation
g. Removing the tube
h. Complications of intubation

5. Inhalation anesthetic equipment
a. Function and principles of operation
b. Components of the anesthetic machine
i. Oxygen supply
ii. Anesthetic vaporizer
iii. Breathing circuit
iv. Scavenging system

c. Compressed gas cylinders
i. Parts, sizes, and capacities
ii. Color coding and other safety features

d. Alternative oxygen sources
e. Tank pressure gauge
f. Pressure reducing valve
g. Line pressure gauge
h. Flow meters
i. Oxygen flush valve
j. Anesthetic vaporizer
i. Precision vs. non-precision
ii. Vaporiser out of circuit (VOC) vs. vaporizer in circuit (VIC)
iii. Factors affecting output

k. Rebreathing circuit
i. Unidirectional flow valves
ii. Pop-off valve
iii. Reservoir bag
iv. Carbon dioxide absorber canister

v. Pressure manometer
vi. Air intake valve
vii. Breathing tubes
l. Non-rebreathing circuit
i. Endotracheal tube connector
ii. Fresh gas inlet
iii. Reservoir bag
iv. Overflow valve or port
v. Breathing tubes
vi. Mapleson classification system
vii. Common names of non-rebreathing circuits
viii. Universal control arm
m. Scavenging system
i. Function
ii. Passive vs. active systems
iii. Waste gas port
iv. Transfer tubing
v. Interface
vi. Gas evacuation system
vii. Activated charcoal canisters
n. Operation of the machine
i. Selecting a machine
ii. Assembling the machine
iii. Choosing a breathing circuit, bag, and tubes
iv. Semi-closed vs. closed system
v. Choosing oxygen flow rates
vi. Daily set-up

6. Monitoring the anesthetized patient
a. Overview of the anesthetic stages and planes
b. Principles and frequency of monitoring
c. American College of Veterinary Anesthesia and Analgesia (ACVAA) monitoring guidelines
d. Physical assessment of vital signs
i. Indicators of circulation
1. Heart rate and rhythm
2. Capillary refill time
3. Pulse strength
4. Arterial blood pressure
ii. Indicators of oxygenation
1. Mucous membrane color
2. Oxygen saturation
3. Blood gases
iii. Indicators of ventilation
1. Respiratory rate and tidal volume
2. End-tidal carbon dioxide level
iv. Body temperature
1. Changes in thermoregulation during anesthesia
2. Techniques used to maintain body temperature
3. Malignant hyperthermia
e. Assessment of anesthetic depth
i. Reflexes
1. Swallowing
2. Laryngeal
3. Palpebral
4. Pedal
5. Corneal
6. Pupillary light reflex
ii. Other indicators of anesthetic depth
1. Spontaneous movement
2. Muscle tone

3. Eye position
4. Pupil size
5. Nystagmus
6. Salivary and lacrimal secretions
7. Response to surgical stimulation

f. Judging anesthetic depth
g. Monitoring equipment
   i. Measuring heart rate and rhythm
      1. Electrocardiograph
      2. Esophageal stethoscope
   ii. Measuring blood pressure
      1. Systolic, diastolic, and mean arterial pressure
      2. Causes and treatment of hypotension
      3. Direct arterial blood pressure monitoring
      4. Doppler blood flow detector
      5. Oscillometric blood pressure monitor
   iii. Measuring oxygenation
      1. Physiology of oxygen transport
      2. Pulse oximeter
      3. Blood gases
   iv. Measuring ventilation
      1. Apnea monitor
      2. Capnograph
h. Record keeping

7. Anesthesia of small animals (dogs and cats)
   a. Anesthetic induction
      i. IV induction
      ii. IM induction
      iii. Mask induction
      iv. Chamber induction
   b. Anesthetic maintenance
      i. Inhalant maintenance
      ii. Maintenance with repeat IV boluses
      iii. Maintenance with constant rate infusion
      iv. Maintenance with IM agent
   c. Patient positioning, comfort and safety
   d. Anesthetic recovery
      i. Signs of recovery
      ii. Factors affecting recovery
      iii. Monitoring during recovery
      iv. Extubation
8. Anesthesia of large animals
   a. Equine anesthesia
      i. General anesthesia
      ii. Field anesthesia
      iii. Standing sedation
   b. Ruminant anesthesia
      i. General anesthesia
      ii. Local anesthesia
   c. Swine anesthesia
   d. Special problems associated with large animal general anesthesia
   e. Differences from small animal anesthesia
9. Anesthesia of laboratory animals
   a. Patient assessment and preparation
   b. Techniques for induction and maintenance
      i. Anesthetic agents and protocols
      ii. Administering an intraperitoneal (IP) injection
   c. Monitoring laboratory animals
   d. Anesthesia of ferrets

e. Anesthesia of rabbits
f. Anesthesia of rodents
g. Differences from small animal anesthesia

10. Special anesthetic procedures
    a. Local and regional anesthesia
        i. Local anesthetics
            1. Action and indications
            2. Effects and side effects
            3. Clinical use
        ii. Routes of administration
            1. Topical
            2. Infiltration
            3. Nerve blocks
            4. Regional blocks
            5. Epidural anesthesia
    b. Ventilation
        i. Normal ventilation
        ii. Indications for ventilatory support
        iii. Assisted vs. controlled ventilation
        iv. Manual ventilation
            1. Periodic and intermittent mandatory manual ventilation
        v. Mechanical ventilation
            1. Types of ventilators
            2. Intermittent mandatory mechanical ventilation
        vi. Risks of controlled ventilation
    c. Neuromuscular blockade
        i. Indications and use
        ii. Neuromuscular blockers
11. Anesthetic problems and emergencies
    a. Equipment issues
        i. Recognition and causes
        ii. Management and prevention
    b. Patient problems
        i. Recognition and causes
        ii. Management and prevention
    c. Managing high-risk patients
12. Analgesia
    a. Physiology of pain
        i. Nociception
        ii. Hypersensitivity
        iii. Consequences of untreated pain
        iv. Common conditions causing pain
    b. Classifications of pain
        i. Inflammatory
        ii. Neuropathic
        iii. Idiopathic
        iv. Visceral vs. somatic
        v. Acute vs. chronic
    c. Signs of pain
        i. Physiologic signs
        ii. Behavioral signs
    d. Assessment of pain
        i. Assessment scales
        ii. Frequency of assessment
        iii. Assessing response to treatment
    e. Pain control
        i. Preemptive analgesia
        ii. Goals of treatment
        iii. Multimodal therapy
        iv. Commonly used agents

1. Opioids
2. NSAIDs
3. Ketamine
4. Alpha2 agonists
5. Local anesthetics

v. Alternative modalities for treatment of pain

13. Veterinary Dental Techniques
    a. Performing a complete dental cleaning
        i. Safety issues
        ii. Performing an oral examination
            1. Assessing plaque and calculus
            2. Assessing periodontal disease
            3. Assessing occlusion
        iii. Probing the sulci
        iv. Removing supragingival calculus
            1. Ultrasonic scaling
            2. Hand scaling
        v. Removing subgingival calculus (subgingival curettage)
        vi. Checking for missed plaque and calculus
        vii. Polishing
        viii. Sulcus irrigation
        ix. Fluoride treatment
        x. Charting findings and interventions using symbols

Resources

Perrone, Jeanne, editor. *Small Animal Dental Procedures for Veterinary Technicians and Nurses*. 2nd ed. John Wiley & Sons, Inc., 2021.

Bassert, Joanna, editor, et al. *McCurnin's Clinical Textbook for Veterinary Technicians*. 10th ed. Elsevier, 2022.

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Bryant, Susan, editor. *Anesthesia for Veterinary Technicians*. Wiley-Blackwell, 2010.

Grubb, Tamara, et al. *Anesthesia and Pain Management for Veterinary Nurses and Technicians*. Teton NewMedia, 2020.

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Davis, Harold, et al. "2013 AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats" Journal of the American Animal Hospital Association vol. 49, no. 3, May 2013, pp. 149-159 .

Epstein, Mark E., et al. "2015 AAHA/AAFP Pain Management Guidelines for Dogs and Cats." Journal of the American Animal Hospital Association, vol. 51, no. 2, Mar. 2015, pp. 67-84. March 2015.

Grubb, Tamara, et al. "2020 AAHA Anesthesia and Monitoring Guidelines for Dogs and Cats." Journal of the American Animal Hospital Association, vol. 56, no. 2, Mar. 2020, pp. 59-82. .

Bellows, Jan, et al. "2019 AAHA Dental Care Guidelines for Dogs and Cats." Journal of the American Animal Hospital Association, vol. 55, no. 2, Mar. 2019, pp. 49-69.

Robertson, Sheilah,et al. "AAFP Feline Anesthesia Guidelines." Journal of Feline Medicine and Surgery, vol. 20, no. 7, July 2018, pp. 602-634.

Resources Other

American College of Veterinary Anesthesia and Analgesia. *Suggestions for monitoring anesthetized veterinary patients*. Accessed December 2020 at www.acvaa.org (https://catalog.tri-c.educ0005.odf/www.acva.org).

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