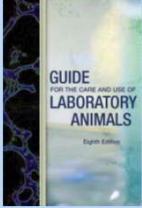



Chapter 4: Veterinary Care



Guidance Relevant to Vet Care


- All who care for, use, or produce animals for research, testing or teaching **must** assume responsibility for their well-being (Ch. 1).
- The **AV** is **responsible** for the health and well-being of all laboratory animals used at the institution (Ch. 2).
- Veterinary care **must** be provided if lesions or illnesses associated with restraint are observed (Ch. 2).
- Veterinary care is an **essential** part of an animal care and use program (Ch. 4).



MUST

Veterinary Care “**MUST**”s

- An acceptable veterinary program that offers a high quality of care and ethical standards **must** be provided, regardless of the number of animals or species being maintained.
- Institutions **should** contact appropriate authorities to ensure compliance with relevant statutes and other transportation requirements that **must** be met for animals to cross international boundaries.



MUST

Veterinary Care “**MUST**”s

Procedures **must** be in place to provide for emergency veterinary care both during and outside of regularly scheduled hours.

- Such procedures **must** enable timely reporting of animal injury, illness, or death of the animal.
- A veterinarian or designee **must** be available to expeditiously assess the animal’s condition, treat the animal, investigate an unexpected death, or advise on euthanasia.
- In the case of a pressing health problem, if the responsible person is not available or a consensus between investigator and vet cannot be reached concerning treatment, the vet **must** have the authority, delegated by senior administration and the IACUC to treat, remove from the experiment, institute appropriate measures to relieve severe pain or distress or euthanize the animal if necessary.

MUST

Veterinary Care “**MUST**”s

Veterinary Care

- All personnel involved in animal care and use **must** comply with federal laws and regulations regarding human and veterinary drugs and treatments.
- Researchers conducting surgical procedures **must** have appropriate training to ensure good surgical technique is practiced.
- Antinociception occurs at a surgical plane of anesthesia; prior to surgery, adequate antinociception **must** be ascertained.
- Agents used to provide anesthesia and analgesia **must** be used before their expiration dates and should be acquired, stored, use recorded, and disposed legally and safely.

MUST

Veterinary Care “**MUST**”s

Veterinary Care


- Special attention is required to ensure proficiency when a physical method of euthanasia is used. Death **must** be confirmed by personnel trained to recognize cessation of vital signs in the species being euthanized.
- It is **imperative** that any proposed use of neuromuscular blocking drugs be carefully evaluated by the veterinarian and the IACUC to ensure the well-being of the animal.



Veterinary Care- Introduction

An adequate veterinary care program consists of assessment of animal well-being and effective management of:

- Procurement and transportation
- Preventive medicine (including quarantine, biosecurity, surveillance)
- Clinical disease, disability, related health issues
- Surgery and perioperative care
- Pain and distress
- Anesthesia and analgesia
- Euthanasia



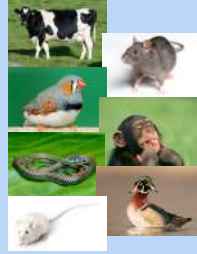
“...a veterinary program that offers a high quality of care and ethical standards **must** be provided, regardless of the number of animals or species maintained.”

Veterinary Care - Introduction

The veterinary care program is the responsibility of the attending veterinarian (AV), who is certified or has training or experience in lab animal science and medicine or is otherwise qualified in the care of the species being used.

The AV **should** provide guidance to investigators and all personnel involved in the care and use of animals to ensure appropriate husbandry, handling, medical treatment, immobilization, sedation, analgesia, anesthesia, and euthanasia.

In addition, the AV **should** provide guidance and oversight to surgery programs and perioperative care involving animals.



Veterinary Care – Procurement and Transportation

Animal Procurement

- All animals **must** be acquired lawfully.
- Before procuring animals, the principal investigator **should** confirm that there are sufficient facilities and expertise to house and manage the species being acquired.
- Procurement of animals **should** be linked to the prior approval of animal use and number by the IACUC.
- Appropriate records and other forms of documentation **should** be maintained for animals acquired by an institution for its investigators.
- Potential vendors **should** be evaluated for the quality of animals they supply.

Veterinary Care – Procurement

- The use of purpose-bred and pre-conditioned animals is preferable when consistent with research, teaching, and testing objectives.
- In general, animals used for scientific purposes should not be obtained from pet stores or pet distributors due to the unknown or uncontrolled background of animals from these sources and potential for introducing health risks to personnel and other facility animals.
- Breeding colonies should be established based on need and managed according to principles of animal reduction such as cryopreservation for rodent stocks or strains.




Veterinary Care – Transportation

Transportation

- Governed by a number of US regulatory agencies and international bodies (USDA, IATA, US FWS, CITES, NRC).
- Institutions should contact appropriate authorities to ensure compliance with relevant statutes and other transportation requirements that **MUST** be met for animals to cross international boundaries...
- Careful planning for all types of transportation should occur to ensure animal safety and well-being.
- The process of transportation should provide an appropriate level of animal biosecurity, while minimizing zoonotic risks, protecting against environmental extremes, avoiding overcrowding, providing for animal physical, physiologic or behavioral needs and comfort, and protecting the animals and personnel from physical trauma.


Veterinary Care – Transportation

- Movement of animals should be planned and coordinated by responsible and well-trained persons at the sending and receiving sites to minimize animal transit time or delays in receipt.
- Shipping should be coordinated to ensure animals arrive during normal business hours or alternate arrangements made.
- All animals in transit should be accompanied by appropriate documentation to minimize delays.




Veterinary Care – Transportation

- For non-commercial sources of animals, it is important for a veterinarian to review the health status.
 - Special considerations for pregnant, geriatric, perinatal animals, or animals with medical conditions or surgeries.
- Although ensuring animal biosecurity during transportation is important, it is of particular importance for immunocompromised, genetically modified, and specific pathogen free rodents.
- Private vehicles discouraged because of potential animal biosecurity, safety, health, and liability risks for the animals, personnel, and institution.



Veterinary Care – Transportation


- For aquatic species (such as fish), and for amphibians, special considerations are required for transportation in an aqueous or sufficiently moist environment.
- Special attention should be given to avoiding temperature extremes for poikilotherms.
- Appropriate loading and unloading facilities should be provided.
- Facilities and procedures should be in place to ensure animal well-being and personnel safety.



Veterinary Care – Preventive Medicine

Animal Biosecurity

- *Animal biosecurity* refers to all measures taken to identify, contain, prevent, and eradicate known or unknown infections that may cause clinical disease, alter physiologic and behavioral responses, or otherwise make animals unsuitable for research.
- Animal biosecurity practices should be applied to all species but particularly important when housing large numbers under intensive conditions (rodents).
- Includes all measures to control known or unknown infections in lab animals.




Veterinary Care – Preventive Medicine

Biosecurity elements:

- Only receive animals with defined health status
- Personnel and materials not serving as fomites
- Practices that reduce the likelihood of cross contamination
- Comprehensive, ongoing health status evaluation
- Containment and eradication of infectious agents

Related components

- Screening suppliers (animals and consumables)
- Treatment of animals/products at entry
- Comprehensive pest control program
- Biologics screening



Veterinary Care – Preventive Medicine


Quarantine and Stabilization

- Quarantine: the separation of newly received animals from those already in the facility in a way that prevents potential spread of contaminants, until the health and possibly microbial status of the newly received animals has been determined.
 - Transportation of animals can be stressful and may induce recrudescence of subclinical infections harbored by an animal.
- For animals not typically housed in research settings, consideration should be given to provisions to assist with acclimation (e.g. sheep shearing prior to indoor housing, etc.)
- The length of time for acclimation (stabilization) will depend on the type and duration of animal transportation, the species, and the intended use of the animals.

Veterinary Care – Preventive Medicine

Separation by Health Status and Species

- Physical separation of species is recommended to prevent interspecies disease transmission and to eliminate the potential for anxiety and physiologic and behavioral changes due to interspecies conflict.
- Intraspecies separation may be essential when animals obtained from multiple sites or sources differ in pathogen status.




Veterinary Care – Surveillance, Diagnosis, Treatment, and Control of Disease

- Appropriate procedures should be in place for disease surveillance and diagnosis.
- Unexpected deaths and signs of illness, distress, or other deviations from normal in animals should be reported promptly and investigated, as necessary, to ensure appropriate and timely delivery of veterinary medical care.
- Health monitoring programs also include veterinary herd/flock health programs for livestock, and colony health monitoring programs for aquatic and rodent species.


Veterinary Care – Surveillance, Diagnosis, Treatment, and Control of Disease

- If a disease or infectious agent is identified within a facility or colony, the choice of therapy should be made by the veterinarian in consultation with the investigator.
- If the animal is to remain on study, the selected treatment plan should be therapeutically sound and, when possible, interfere minimally with the research process.



Veterinary Care – Clinical Care and Management

- The structure of the veterinary care program, including the number of qualified veterinarians, should be appropriate to fulfill program requirements.
- The veterinarian should be familiar with the species and various uses of animals in the program, and have access to medical/experimental treatment records.



Veterinary Care – Clinical Care and Management


Medical Management

- There should be a timely and accurate method for communication of any abnormalities or concerns regarding animal health, behavior, and well-being to the veterinarian or their designee.
- Reports should be triaged to ensure priority attention to emergent animal needs, and the veterinarian or designee should perform objective assessment to determine course of action.
- The AV or designee should make every effort to discuss problems with PI to jointly determine best course of action.

Veterinary Care – Clinical Care and Management

Medical Management


- Recurrent or significant problems involving experimental animal health should be communicated to the IACUC.
- All treatments and outcomes should be documented.



Veterinary Care – Clinical Care and Management

Emergency Care


- Procedures **must** be in place to provide for emergency care (including outside normal work hours).
- Procedures **must** enable animal care and research staff to make timely reports of animal injury, illness, or death.
- The AV or designee **must** be available to expeditiously assess animal, treat animal, investigate unexpected death, or advise on euthanasia
- The AV **must** have authority delegated by senior admin and IACUC to intervene if necessary when responsible person is unavailable or consensus is not forthcoming.



Veterinary Care – Clinical Care and Management


Recordkeeping

- The AV should be involved in establishing, reviewing, and overseeing medical and animal use records.
- All involved in animal care and use **must** comply with federal laws and regulations regarding human and veterinary drugs and treatments.
- Drug records and storage procedures should be reviewed during facility inspections.



Veterinary Care – Surgery

Successful surgical outcomes require appropriate attention to pre-surgical planning, personnel training, anesthesia, aseptic and surgical technique, assessment of animal well-being, appropriate use of analgesics, and animal physiologic status during all phases of a protocol involving surgery and postoperative care.




Training

- Researchers conducting surgical procedures **must** have appropriate training to ensure that good surgical technique is practiced.
- The IACUC, together with the AV, is responsible for determining that personnel performing surgical procedures are appropriately qualified and trained in the procedures.

Veterinary Care – Surgery

Pre-surgical Planning

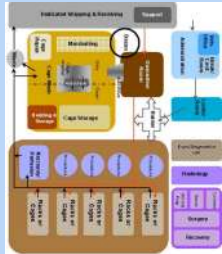
- Should include input from all members of the surgical team, identifying personnel, their roles and training needs, and equipment and supplies required for the planned procedures.
- A veterinarian should be involved in discussions of the selection of anesthetic agents and doses as well as the plan for perioperative analgesic use.



Veterinary Care – Surgery

Surgical Facilities


- Unless an exception is specifically justified as an essential component of the research protocol and approved by the IACUC, aseptic surgery should be conducted in dedicated facilities or spaces.
- When determining the appropriate location for a surgical procedure (either a dedicated operating room/suite or an area that provides separation from other activities), the choice may depend on the species, the nature of the procedure (major, minor, or emergency), and the potential for physical impairment or postoperative complications, such as infection.



Veterinary Care – Surgery

Surgical Procedures


- Major survival surgery* (e.g. laparotomy, thoracotomy, joint replacement, and limb amputation) penetrates and exposes a body cavity, produces substantial impairment of physical or physiologic functions, or involves extensive tissue dissection or transection.



Veterinary Care – Surgery

Surgical Procedures

- Minor survival surgery* does not expose a body cavity and causes little or no physical impairment (wound suturing, peripheral vessel cannulation, percutaneous biopsy, routine agricultural animal procedures such as castrations, and most outpatient procedures).
- Animals recovering from minor procedures do not show significant signs of postoperative pain, have minimal complications, and return to normal function in a relatively short time.



Veterinary Care – Surgery

Surgical Procedures

- When attempting to categorize a particular surgical procedure, the following should be considered:
 - Potential for pain and other postoperative complications
 - Nature of the procedure as well as the size and location of the incision(s)
 - Duration of the procedure
 - Species, health status and age of the animal

Veterinary Care – Surgery

Surgical Procedures

- Laparoscopic surgeries and some procedures associated with neuroscience research (e.g. craniotomy, neurectomy) may be classified as major or minor.
 - e.g. laparoscopic techniques with minimal trauma or sequelae (avian sexing, oocyte collection) could be minor
 - Others (hepatic lobectomy, choleystectomy) should be considered major
- Whether a laparoscopic procedure is deemed major or minor should be evaluated by the AV and IACUC.

Veterinary Care – Surgery

Surgical Procedures

- For non-survival procedures of extended duration, attention to aseptic technique may be more important in order to ensure stability of the model and a successful outcome.
- It may not be necessary to follow all of the techniques outlined if non-survival surgery is performed but, at a minimum, the surgical site should be clipped, the surgeon should wear gloves, and the instruments and surrounding area should be clean.

Veterinary Care – Surgery


Aseptic Technique

- Regardless of species, aseptic technique includes preparation of the patient and disinfection of the operative site, preparation of the surgeon, sterilization of instruments and other supplies, and use of operative techniques to reduce the likelihood of infection.
- While species of animal may influence manner in which aseptic technique is achieved, inadequate or improper technique may lead to subclinical infection with adverse results.
- General aseptic technique should be followed for all survival surgical procedures.
- Alternative sterilization methods used for rodent surgeries include liquid chemical and dry heat
- Bead or dry heat sterilizers effective to rapidly sterilize working surfaces of surgical instruments but care should be taken to allow proper cooling.

Veterinary Care – Surgery

Aseptic Technique

- Alcohol is neither a sterilant nor a high level disinfectant, but may be acceptable for some procedures, if prolonged contact times are used.



Veterinary Care – Surgery

Intraoperative Monitoring

- Monitoring includes routine evaluation of anesthetic depth and physiologic functions and conditions, such as body temperature, cardiac and respiratory rates and pattern, and blood pressure, and should be appropriately documented.
- Use of balanced anesthesia, including the addition of an intraoperative analgesic agent, can help minimize physiologic fluctuations during surgery.
- Maintenance of normal body temperature is of particular importance in small animals where the high surface area to body weight ratio may easily lead to hypothermia.

Veterinary Care – Surgery

Intraoperative Monitoring


- Fluid replacement may be a necessary component of intraoperative therapy depending on the duration and nature of the procedure.
- For aquatic species, such as fish and amphibians, care should be taken to keep the skin surfaces moist and minimize drying during surgical procedures.



Veterinary Care – Surgery

Postoperative Care

- During the anesthetic recovery period, animals should be in a clean, dry and comfortable area where they can be observed frequently by trained personnel.
- Particular attention should be given to thermoregulation, cardiovascular and respiratory function, electrolyte and fluid balance, and management of postoperative pain or discomfort.
- Appropriate medical records should also be maintained.



Veterinary Care – Pain and Distress

The proper use of anesthetics and analgesics in research animals is an *ethical* and *scientific* imperative.

Unless the contrary is known or established, it should be considered that procedures that cause pain in humans may also cause pain in other animals (IRAC 1985).

Unrelieved pain may lead to 'wind-up', a phenomenon in which unrelieved central pain sensitization may lead to an increased pain response to otherwise non-painful stimuli (allodynia).

Veterinary Care – Pain and Distress

Species-specific behavioral manifestations of pain or distress are used as indicators:

- Vocalization (dogs)
- Depression (all)
- Anorexia (all)
- Rapid or labored respiration (rodents, birds, fish)
- Lack of grooming (mammals and birds)
- Increased aggression (mammals and birds)
- Periocular and nasal porphyrin discharge (rodents)
- Abnormal appearance or posture (all)
- Immobility (all)

Veterinary Care – Pain and Distress

It is therefore essential that personnel caring for and using animals be trained in species-specific and individual clinical, behavioral, physiologic, and biochemical indicators of well-being.

Distress may be defined as an aversive state in which an animal fails to cope or adjust to various stressors with which it is presented.

- May not induce an immediate and observable pathologic or behavioral alteration, making it difficult to monitor and evaluate the animal's state when it is present.

Veterinary Care – Anesthesia and Analgesia

- The selection of appropriate analgesics and anesthetics should reflect professional veterinary judgment as to which best meets clinical and humane requirements as well as the needs of the research protocol.
- Preemptive analgesia enhances intraoperative patient stability and optimizes postoperative care and well-being by reducing postoperative pain.
- Local anesthetics/blocks
- Chronic pain analgesia (transdermal patches, etc.)
- Due to wide individual variation in response to analgesics, animals should be closely monitored during and after painful procedures and should receive additional drugs as needed to ensure appropriate pain management.

Veterinary Care – Anesthesia and Analgesia

- Nonpharmacologic control of pain may be effective and should not be overlooked as an element of the post-procedural or perioperative care for research animals.
- Appropriate nursing support may include:
 - Quiet, darkened recovery or resting place
 - Timely wound or bandage maintenance
 - Provision of increased ambient warmth and a soft resting surface
 - Rehydration with oral or parenteral fluids
 - Return to normal feeding through the use of highly palatable foods or treats

Veterinary Care – Anesthesia and Analgesia

- Level of consciousness, degree of antinociception, and status of cardiovascular, respiratory, musculoskeletal, and thermoregulatory systems should all be used to adequacy of anesthetics.
- Antinociception occurs at a surgical plane of anesthesia and **must** be ascertained before surgery.

Veterinary Care – Anesthesia and Analgesia

- Guidelines for selection and proper use of analgesic and anesthetic drugs should be developed and periodically reviewed and updated as standards and techniques are refined.
- Agents used to provide anesthesia and analgesia **must** be used before their expiration dates and should be acquired, stored, use recorded, and disposed of legally and safely.

Veterinary Care – Anesthesia and Analgesia

- It is imperative that any proposed use of neuromuscular blocking drugs be carefully evaluated by the AV and the IACUC to ensure the well-being of the animal.
- If paralyzing agents are to be used, the appropriate amount of anesthetic should be first defined on the basis of results of a similar procedure using the anesthetic without a blocking agent.

Veterinary Care – Euthanasia

- *Euthanasia* is the act of humanely killing animals by methods that induce rapid unconsciousness and death without pain or distress.
- Standardized methods of that are predictable and controllable should be developed and approved by the attending veterinarian and the IACUC.
- Special consideration should be given to euthanasia of fetuses and larval life forms depending on species and gestational age.



Veterinary Care – Euthanasia

- The acceptability of CO₂ euthanasia for small rodents should be evaluated as new data become available.
- Alternative methods should be considered for neonatal rodents (chemical agents, decap, cervical dislocation).
- Death **must** be confirmed by personnel trained to recognize cessation of vital signs in the species being euthanized.
- All methods should be reviewed and approved by the AV and IACUC



QUESTIONS?



Thank you to COL Jim Sheets, DVM, MPH and LTC Sarah
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