



## CARE 209.01 General Non-Rodent Surgery

The intent of this standard operating procedure (SOP) is to describe procedures for general non-rodent surgery. This SOP is intended for use by qualified personnel on an IACUC approved protocol who will be performing surgery on non-rodent and USDA covered species, or assisting in those procedures. This SOP is approved by the Cornell Institutional Animal Care and Use Committee (IACUC) and the Cornell Center for Animal Resources and Education (CARE). Any exemption must be submitted for approval by the IACUC prior to its application.

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### 1. Introduction

This document outlines pre-, peri, and post-operative procedures for surgery performed on non-rodent and USDA covered species. This policy does not apply to the following mammals: mice, rats, hamsters, guinea pigs, chinchillas, and gerbils. These are basic guidelines and are used in accompaniment with training.

### 2. Materials

- Analgesics
- Anesthetics
- Electric razor
- Gauze
- Antiseptic detergent (e.g., chlorhexidine, povidone iodine)
- 70% alcohol
- Sterilization equipment
- Sterile surgical instruments and draping
- Suture material
- Sterile gauze
- IV fluids
- Stethoscope and thermometer
- Supplemental heat source
- Clean scrubs, shoe covers, surgical mask, bonnet, sterile gown, sterile gloves
- Emergency airway equipment
- Intubation and catheterization equipment, needles, and syringes

### 3. Procedures

**NOTE:** Perform non-rodent surgery using aseptic procedures consistent with the *Guide for the Care and Use of Laboratory Animals* and the Animal Welfare Regulations, in a dedicated surgical suite.

#### a. Surgical Principles

##### i. General principles:

- Clean and disinfect all surfaces and equipment in the dedicated surgical suite.

- Ensure that all required materials are ready and at hand.
  - Minimize traffic flow in the surgical suite.
  - ii. Sterilization of instruments:
    - Sterilize all instruments, gauze, drapes, etc. prior to surgery.
      - (a) Clean instruments prior to sterilization to remove organic material.
      - (b) Wrap or package instruments in appropriate packs. Include a sterilization indicator in the pack and a temperature sensitive indicator on the outside of the pack to validate the package and its contents are exposed to sterilization conditions.
      - (c) Date the packs upon sterilization and store in a manner that prevents package exposure to moisture, dust, and damage (e.g. a clean cabinet in an environmentally controlled room). Items not stored to prevent the above package exposures must be used within six months of that date.
    - Achieve sterilization by autoclaving (steam), or gas sterilization (e.g. ethylene oxide or hydrogen peroxide).
    - Prior to opening and using sterilized equipment, visually inspect the package. Do not use package contents if the outer temperature indicator has not changed to the appropriate color or the package shows signs of water or mechanical damage.
    - Upon opening the package, visually inspect the inner temperature indicator. Do not use package contents if indicator has not changed to the appropriate color.
  - iii. Aseptic technique:
    - Surgeon and surgical assistant attire:
      - (a) Wear clean scrubs, shoe covers, surgical mask, bonnet, sterile gown, and sterile gloves.
      - (b) Do not touch non-sterile surfaces. Replace instruments and/or re-glove hands that touch non-sterile surfaces.
    - Observers/anesthetist attire: Wear clean scrubs, shoe covers, bonnet, and surgical mask.
- b. Preoperative Care
- i. Perform a complete veterinary preoperative physical examination on the surgical subject.
  - ii. Administer analgesics according to CARE SOP, 102 Analgesia.
  - iii. Anesthetize the animal, in an area designated for surgical preparation and anesthesia, according to the following CARE SOPs:
    - CARE SOP 103, Rabbit Anesthesia
    - CARE SOP 104, Dog Anesthesia
    - CARE SOP 105, Cat Anesthesia

**NOTE:** Contact CARE staff at 607-253-4378 or [care@cornell.edu](mailto:care@cornell.edu) for guidance regarding anesthesia administration for species not listed in 3.b.iii
  - iv. Apply ophthalmic ointment to both eyes to prevent corneal desiccation.
  - v. Shave an area approximately twice the size of the anticipated surgical field with an electric razor. Remove all loose hair and debris from the animal.
  - vi. Clean the surgical area with gauze and a disinfectant scrub (e.g. povidone iodine or chlorhexidine) to remove the majority of debris from the surgical site.

- vii. Transfer the patient to the designated surgical suite only after the animal has been shaved and coarsely cleaned with a disinfectant scrub. Perform final preparation of the surgical site after the animal has been positioned on the surgery table.
  - viii. Antiseptic skin preparation:
    - Use aseptic technique when performing skin antisepsis.
    - Start antiseptic application at the center of the surgical site and move to the outside of the prepared area in a circular manner.
    - Perform three scrubs with an antiseptic soap solution (e.g., chlorhexidine scrub diluted to manufacturer's recommendations) and three alternating rinses with a non-soap solution (e.g. alcohol, diluted non-soap antiseptic, or sterile water).
  - ix. Sterile surgical draping:
    - Drape the animal with a sterile, impermeable covering to isolate the disinfected area. This is performed by the gloved and gowned surgical team.
    - Fix the drape in place.
    - Cover a stand or table with a sterile drape on which sterile equipment is to be placed.
  - x. Prior to starting surgery, verify the depth of anesthesia by loss of the palpebral reflex, pedal withdrawal reflex, and jaw tone.
- c. Monitoring, and Supportive Care.
- i. Calculate the dosage of emergency drugs before the start of anesthesia.
  - ii. Administer IV fluids to animals anesthetized longer than 30 minutes to maintain adequate hydration.
  - iii. Maintain normal body temperature by the use of warm circulating water blankets, thermal pads, and/or warmed IV fluids.
- NOTE:** Do not use over the counter electric heating pads as these are prone to overheating.
- iv. Maintain aseptic conditions during all survival procedures.
  - v. Continuously monitor heart rate, respiratory rate, and temperature.
  - vi. Document these parameters at least every 15 minutes.
  - vii. Monitor hemodynamic parameters to assure adequate gas exchange.
    - Mucous membranes should be pink and moist
    - Capillary refill time should be less than 2 seconds
    - Promptly notify the surgeon if the animal is not within acceptable parameters for that species.
  - viii. Adjust the depth of anesthesia according to the monitored parameters (presence of reflexes, respiratory rate and breathing pattern, and heart rate).
  - ix. In the case of respiratory or cardiac arrest, stop anesthesia, administer oxygen, and begin resuscitation efforts immediately.
- d. Surgical procedures

- i. Use efficient surgical planning to decrease surgical time, tissue contamination, and tissue damage. Handle tissues gently..
- ii. Maintain aseptic conditions during all survival procedures.
- iii. Suture and suturing:
  - Do not use braded suture transdermally.
  - When possible, avoid use of epidermal sutures as this can cause an animal to chew or scratch at the incision site.
- e. Postoperative Care

**NOTE:** Postoperative care begins with recovery from anesthesia, and may extend from days to weeks depending on post-surgical outcomes.

  - i. Place animals in a clean, quiet environment for anesthetic recovery.
  - ii. Do not place recovering animals in the same enclosure as awake animals. Continuously observe the animal and monitor temperature, heart rate and respiratory rate until the animal can maintain a patent airway and sternal recumbency. Emergency airway equipment must be available in the anesthetic recovery area. Administer oxygen and/or respiratory support if apnea or hypoxia are observed.
  - iii. Keep the animal warm and dry to minimize hypothermia.
  - iv. Administer analgesics post-surgically and for the next 72 hours or longer, as outlined in [CARE SOP 102 Analgesia](#).
  - v. Determine the need for further supportive care, such as fluids, electrolytes, antibiotics, etc., based on the animal's condition and the procedure performed.
  - vi. Examine the wound daily until completely healed.
  - vii. Remove skin sutures (if any) after 10-14 days.
- f. Record Keeping: see [CARE SOP 542 Maintaining Clinical Records for Animal Research Models](#)

#### 4. Safety

See CARE SOP 707, Animal Related Injury and CARE SOP 712 Waste Anesthetic Gas Scavenging Systems.

#### 5. Contingencies

Emergency veterinary care is available at all times, including after working hours and on weekends and holidays, through CARE (Pager 1-800-349-2456).

#### 6. References

- Animal Welfare Act: <http://www.nal.usda.gov/awic/legislat/usdaleg1.htm>
- CARE SOP 102 Analgesia  
<http://www.research.cornell.edu/care/documents/SOPs/CARE102.pdf>
- CARE SOP 103 Rabbit Anesthesia:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE103.pdf>
- CARE SOP 104 Dog Anesthesia:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE104.pdf>
- CARE SOP 105 Cat Anesthesia:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE105.pdf>

- CARE SOP 542 Maintaining Clinical Records:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE542.pdf>
- CARE SOP 707 Animal Related Injury:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE707.pdf>
- CARE SOP 712 Waste Anesthetic Gas Scavenging Systems:  
<http://www.research.cornell.edu/care/documents/SOPs/CARE712.pdf>
- Fossum, Theresa, *Small Animal Surgery Textbook, Third Edition*, Mosby: St. Louis, MO, 2007
- *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*, Federation of Animal Science Societies: Savoy, IL, 1999.
- Southwestern Medical Center Non-Rodent Surgery website:  
<http://www.utsouthwestern.edu/utsw/cda/dept238828/files/269462.html>
- University of South Florida website: <http://www.research.usf.edu/cm/SOP.htm>

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