POLICY

Successful surgical outcomes depend on appropriate pre-surgical planning, personnel training, anesthesia, aseptic and surgical technique, use of analgesics, assessment of animal physiological status, and post-operative monitoring and care.

All surgical procedures must be reviewed and approved by the IACUC. Personnel performing surgery must be knowledgeable about surgical techniques and have adequate training and skills to conduct the surgery. Principal investigators must provide locations, to the IACUC, of all areas where surgeries are performed.

This policy is applicable for mammalian surgery only. If proposing surgical procedures for any other class of animals, please consult the UNMC or UNO Attending Veterinarian.

Major survival surgery on non-rodents must be performed in an approved, dedicated suite that includes separate areas for induction, surgery, and recovery.

Non-survival surgery, minor surgery and any surgeries on rodents do not require a dedicated facility, and can be done in a designated area such as a procedure room. The area must be easily sanitized and uncluttered. The area may not be used for any other purpose during the time of surgery. Sufficient space for patient preparation and patient recovery is to be provided.

Surgical procedures conducted at field sites need not be performed in dedicated facilities, but must be performed using aseptic procedures.

Survival surgery or any surgery conducted at field sites must be performed using aseptic techniques as outlined in the procedure section. Non-survival surgery does not require the use of aseptic techniques, though at a minimum, the animal is to be clipped, the surgeon is to wear clean gloves, and instruments and the surrounding area must be kept clean.

Careful monitoring during the intra-operative and post-operative (for survival surgery) period increases the likelihood of a successful surgical outcome. Surgical records of anesthetics, analgesics, procedures performed, intra-operative monitoring parameters, and post-operative monitoring and care must be maintained. The records are subject to periodic and unannounced inspections by the IACUC, CM or UNO animal care staff, the Protocol Assessment Liaison (PAL), and other regulatory and accreditation agencies as necessary.

After recovery from anesthesia, monitoring should include assessing basic biologic functions e.g., intake and elimination, behavioral signs of postoperative pain, monitoring for post-surgical infections, dehiscence, bandaging as appropriate, and timely removal of skin sutures, clips or staples.

DEFINITIONS

• **Survival surgery** is defined as any surgery from which the animal recovers consciousness.

• **Non-survival surgery** is defined as any surgery in which the animal will not regain consciousness.
• **Major surgery** is defined as any surgery which penetrates and exposes a body cavity or produces substantial impairment of physical or physiologic function.

• **Minor surgery** is any operative procedure in which only skin or mucous membrane is incised (e.g., vascular cut down for catheter placement or implanting pumps in subcutaneous tissue).

• **Multiple major survival surgery** occurs when an animal undergoes more than one major survival surgery. Multiple major survival surgery requires justification and review and approval by the IACUC. **NOTE:** See the [Policy for Multiple Major Survival Surgery](#) for further information.

**REQUIREMENTS**


*Animal Welfare Act and Regulations, in accordance with 9 CFR, Ch.1 Part 2- Standards- Subpart C, 2.31 (d)(1)(ix); 2.32 (a-c); 2.33; 2.40*

*USDA Animal Care Resource Guide Policies, Policy #3, Veterinary Care-Surgery, Pre-and Post-Procedural Care and Health Records.*

**PROCEDURE for SURGERIES**

**1.0 Surgery Area**

1.1 Major survival surgery on non-rodents must be performed in an approved, dedicated suite that includes separate areas for animal preparation, surgeon scrub, surgery, and recovery.

1.2 Non-survival surgery and minor surgery conducted on non-rodents, and all surgery conducted on rodents does not require a dedicated facility but may be performed in a designated area such as a procedure room. Surgery may be conducted on a clean, uncluttered lab bench or table surface. The area should be wiped with an appropriate disinfectant before and after use, or covered with a clean drape.

1.3 Surgical procedures conducted at field sites need not be performed in dedicated facilities, but must be performed using aseptic procedures.

**2.0 Aseptic Preparation of Instruments**

2.1 All instruments must be sterilized, but the method of choice may be determined by the surgical instruments or device being used. Steam sterilization (autoclaving) is the most commonly used and recommended technique. Gas sterilization (ethylene oxide) can also be used. Acceptable techniques for cold sterilization include soaking in 2% glutaraldehyde for ten hours or in 6% stabilized hydrogen peroxide for six hours. Instruments must be rinsed with sterile saline or sterile water before use.

2.2 Rodents - When performing surgeries on multiple rodents during a single session, instruments are to be disinfected between animals, preferably by autoclaving. Gloves should be changed between surgeries. Recent evidence does support that the use of alcohol may be acceptable for some procedures if prolonged contact times are used (Huerkamp, 2002) or for limited numbers of serial rodent surgeries under specific conditions (Keen et al. 2010).

A. The IACUC will evaluate the use of alcohol with due consideration for animal welfare and scientific outcomes based on a review of current relevant literature, and consistent with expected surgical outcomes.

B. As a general policy, a modified alcohol technique may be used to sterilize/disinfect gloves and instruments between subsequent procedures performed on rats and mice for up to 5 animals only. After 5 animals a new set of sterile gloves and sterilized instruments by autoclaving or approved chemical disinfectant other than alcohol, must be used. Between surgical procedures...
for up to 5 animals, remove all organic material from instruments and disinfect them in a sterile tray containing 70-90% ethyl or isopropyl alcohol with a minimum contact time of 5 minutes. Replace the alcohol when contaminated with blood or other body fluid. Dip the fingertips of the gloves in the alcohol for at least 1 minute between serial procedures.

3.0 Preparation of Animal
3.1 Rodents and Rabbits - Generally, should not to be fasted before surgery due to their high metabolic rates. In addition, they do not have a vomit reflex and therefore cannot vomit during surgery. If due to protocol requirements, fasting is needed, justification, review and approval is required by the IACUC.
3.2 Non-Rodent Species - Animals should be appropriately fasted prior to anesthesia and surgery to prevent vomiting, aspiration, and problems associated with a distended intestinal tract. Fasting recommendations vary with species but is generally an overnight fast.
3.3 Administer approved anesthetic regimen. Place lubricating ophthalmic ointment in the eyes to prevent corneal drying.
3.4 Hair should be removed from the surgical site with clippers or a depilatory. This should be done in a prep area separate from where the actual surgery will be performed.
3.5 Place the animal on a clean absorbent surface. To minimize hypothermia, place the animal on a padded surface and provide warmth with a circulating water blanket, or warm water bottle until recovery. Due to burn potential, do not use an electric heat pad.
3.6 Clean and aseptically prepare the surgical site. The surgical site is to be treated first with an antiseptic scrub and then with an antiseptic solution (chlorhexidine or povidone iodine scrub and solution). This is to be repeated 3 times, and the antiseptic solution applied last, prior to surgery. Use an appropriate surgical scrubbing technique by scrubbing in a gradually enlarging circular pattern from the interior of the shaved area towards the exterior.
3.7 Drape the aseptically prepared surgery site with sterile towels or drapes.

4.0 Preparation of Surgeon
4.1 For non-survival surgeries, clean gloves and clean scrub shirt/gown/lab coat is to be worn.
4.2 For minor survival surgery on non-rodents or major survival surgery on rodents, a surgical mask and a clean scrub shirt/gown/lab coat is to be worn. A sterile gown is recommended, but not required. Using an appropriate antiseptic surgical scrub, wash hands and dry using sterile towels, and then glove aseptically using sterile surgical gloves.
4.3 For major survival surgery on non-rodents, a surgical mask, head cover, and sterile gown is required. Using an appropriate antiseptic surgical scrub, wash hands and dry using sterile towels, and then glove aseptically using sterile surgical gloves.
4.4 For surgeries on multiple rodents at same sitting:
   A. Sterile gloves are to be changed between surgeries if the surgeon touches non-sterile surfaces. Surgeons may soak the fingertips of their gloves for 30 seconds in 70-90% ethyl or isopropyl alcohol between surgeries if aseptic technique has been maintained.

5.0 Operative Procedure
5.1 Antinoceception (lack of response to noxious stimuli) must be ascertained before surgery.
5.2 The animal must be maintained in a surgical plane of anesthesia throughout the procedure.
   A. Assessment of anesthetic depth is typically monitored via pedal withdrawal reflex, jaw tone, and palpebral reflexes.
5.3 Maintain operative records to include:
   A. Date of surgery, operation performed, anesthetics, analgesics, and any other drugs (name, dose, route of administration and times of administration).
   1) Non-rodent surgery at UNMC - must use CM-Form A-1-Pre-Operative/Operative Record
   2) Rodent Surgery- the Form Rodent Surgical Records is available for use. The data collected on this form is required; however, alternate forms may be utilized as long as they contain the required data.
B. Assessment of anesthetic depth and physiological functions such as body temperature, cardiac, respiratory rate/pattern, mucous membrane color. Document every 10 minutes.

1) Non-rodent surgery at UNMC must use CM-Form A-4-Anesthesia Monitoring Log.
2) Rodent Surgery- the Form Rodent Surgical Records is available for use. The data collected on this form is required; however, alternate forms may be utilized as long as they contain the required data.

6.0 Anesthetic Recovery for Survival Surgery

6.1 Place the animal in a warm, dry recovery area. House animals individually until they are fully ambulatory.

6.2 Continue to assess anesthetic depth and physiological functions such as body temperature, cardiac, respiratory rate/pattern, mucous membrane color until animal is recovered. Document every 10 minutes.

6.3 If an ET tube has been placed, this is not to be removed until the animal has regained the swallowing reflex.

6.4 The use of heat lamps and electric heating pads can result in severe burns or hyperthermia in animals that are anesthetized or otherwise unable to escape from the heat. Close observation is required, and the use of circulating water blankets is recommended whenever possible. A circulating water heating blanket is provided in the Comparative Medicine dedicated survival surgery recovery areas.

6.5 All anesthetized animals must be monitored until they regain sternal recumbency and are capable of holding their heads up.

A. Unconscious or anesthetized animals must not be left unattended.

B. Withhold food and water until the animal is fully conscious.

6.6 Provide analgesics as approved in the protocol. Monitor for indications of discomfort, distress, and/or pain.

A. Contact a veterinarian for treatment plan if the animal is experiencing unrelieved discomfort, distress, and/or pain.

6.7 USDA covered species must be returned to the central animal facility within 12 hours unless specific review and approval from the IACUC is granted for keeping the animals out of the facility longer than 12 hours. Non-USDA covered species must be returned to the central animal facility within 24 hours unless specific review and approval from the IACUC is granted for keeping the animals out of the facility longer than 24 hours.

7.0 Postoperative Monitoring

7.1 Subsequent care may include supportive fluids, analgesic agents, and other support as required; monitoring of the animal to include body temperature; monitoring appetite and excretory functions, and providing adequate care of surgical incisions. Monitor indications of discomfort, distress, and/or pain.

A. Contact a veterinarian for a treatment plan if the animal is experiencing unrelieved discomfort, distress, and/or pain.

7.2 Surgical sites must be monitored for signs of infection including evidence of heat, swelling, redness, pain, and/or exudation. Bandages or wound dressings must be changed as needed to keep them clean and dry.

7.3 If applicable, remove skin sutures/staples, 10-14 days post-operatively.

8.0 Post-operative Records

8.1 Maintain daily post-operative recovery observations and treatment (as applicable) including:

A. Administration of any agents including as analgesics or antibiotics

B. Monitoring of incision healing

C. Suture/staple removal

D. Any adverse outcomes

E. Date/time/ personnel conducting observations/treatments.
2) Rodent Surgery-the Form Rodent Surgical Records is available for use. The data collected on this form is required; however, alternate forms may be utilized as long as they contain the required data.

9.0 Record Keeping

9.1 The records are subject to periodic and unannounced inspections by the IACUC, CM or UNO animal care staff, the Protocol Assessment Liaison (PAL), and other regulatory and accreditation agencies as necessary.

A. Rodent Surgery – A form Rodent Surgical Records is available for use. The data collected on this form is required; however, alternate forms may be utilized as long as they contain the required data.
1) The completed forms must be maintained by the Principal Investigator and made available upon request.

B. Non-rodent Surgery at UNMC - The use of Comparative Medicine Form A-1, A-2, A-2 Continued, and A-4 is required.
1) The completed forms must be maintained in close proximity to the animals' housing area in the animal clinical record folders.
2) Blank forms are available in the animal housing room within the animal provided file boxes.

LINKS TO RELATED FORMS, RECORD LOGS, AND SOPS

Rodent Surgical Records

REFERENCES

AAALAC International, FAQ – Aseptic Surgery and Alcohol as a Disinfectant, AAALAC.ORG
