

# Surgery & Aseptic Techniques

## I. Introduction

The *Public Health Service* (PHS) policy based on Public Law requires that institutions receiving grant or contract funds from the PHS adhere to the “Guide for the Care and Use of Laboratory Animals” in studies involving animal subjects. The “Guide” establishes the use of aseptic techniques to prevent clinical infections, *during surgery procedures*. In addition, the USDA requires that animals covered by the Animal Welfare Act (AWA) receive care that meets current standards of veterinary practice. These standards include using aseptic technique for *any type of survival surgery*. Finally, AAALAC uses the PHS, the “Guide for the Care and Use of Laboratory Animals” and USDA regulations as criteria for granting accreditation to biomedical research and *educational* institution. Many private research recipients comply with these same documents. Therefore, aseptic technique is required by regulatory and funding agencies, and is a key to humane animal use and our efforts to improve the quality of research. It is used to reduce microbial contamination to the lowest possible, *during exposure of an animal’s internal cavity*; no procedure, piece of equipment, or germicide alone can achieve that objective.

## II. Kind of Surgeries

1. **Non survival surgery** – an animal is euthanized before recovery from anesthesia. It might not be necessary to follow all the techniques; however at a minimum, the surgical site should be stapled, the surgeon should wear gloves, and the instruments and surrounding area should be clean.
2. **Survival Surgery:**
  - a) The “Guide” states that a ***major survival surgery*** penetrates and expose a body cavity or produces substantial impairment of physical or physiologic functions (such as laparotomy, thoracotomy, craniotomy, joint replacement, *lamenoctomy*, limb amputation and implantation of Alzet minipumps or Silastic tubing). The AWA similarly defines a major operative procedure, as any surgical intervention that penetrates and exposes a body cavity or any procedure that produces permanent impairment of physical or physiological functions.
    - 1) The “Guide “ states that a ***minor survival surgery*** does not expose a body cavity and causes little or no physical impairment (such as wound suturing; peripheral – vessel cannulation: such routine farm-animal procedures as castration, dehorning, and repair of prolapses; and most procedures routinely done on an outpatient basis in veterinary clinical practice). Minor procedures are often performed under less-stringent conditions than major *survival* procedures but still require aseptic technique, sterile instruments, appropriate anesthesia and *training*. Although laparoscopic procedures are often performed on an “outpatient” basis, appropriate aseptic technique is necessary if a body cavity is penetrated.
    - 2) **Multiple Survival Surgery:** An animal recovers from initial surgery (major or minor) and is subsequently reanesthetized for one or more survival surgical procedures (major and/or minor) related to the proposed study. No animal may be used in more than one major operative procedure from which it is allowed to recover, unless, 1) justified for scientific reason, 2) required as routine veterinary procedure or to protect the health or well-being of the animal as determined by the veterinary, PHS or USDA guidelines.

### III. Facilities for Aseptic Surgery

1. Major survival surgeries on non rodents must be performed only in facilities designed, operated, and maintained for that purpose.
2. Minor survival surgery and all *procedures done* on rodents, does not require separate dedicated facilities. A facility may be small and simple, such as a dedicated space in a laboratory appropriately managed to minimize contamination from other activities in the room during surgery. However, aseptic techniques must be used.
3. Surgical facilities should be sufficiently separate from other areas to minimize unnecessary traffic and decrease the potential for contamination.

### IV. IACUC, the attending veterinarian and aseptic surgery

1. IACUC and the attending veterinarian have the responsibility to help assure humane care and use of the animals on which surgery is performed.
2. IACUC also helps to reassure the individuals who perform the surgery that they are appropriately qualified and trained.
3. Animals cannot be used in multiple major survival surgeries, unless it is absolutely necessary. This must be scientifically justified in the protocol and approved by IACUC.
4. There is no regulatory limitation to multiple minor survival surgical procedures. Nevertheless, an IACUC should use professional judgement to limit the number of minor surgical procedures performed on an animal.
5. The IACUC should review an individual's education, training, certification and experience for assessment of general surgical competence and qualifications to perform the specific surgical procedure.
6. To insure that the surgical procedures comply with all regulations, the IACUC may require that the veterinarian observe or assist with at least the first surgery. Assistance could continue with subsequent procedures until a specific surgical procedure is predictable to the satisfaction of the veterinarian.

### V. Survival Surgical Procedures to be included in a protocol

An investigator should provide sufficient detail in the IACUC protocol when describing surgical procedures so that the IACUC can ascertain that the surgical techniques proposed are acceptable and the Attending veterinarian can evaluate the perioperative care program pertaining to adequate veterinary care.

1. Use of appropriate anesthesia and analgesia – dose, route, frequency, duration, syringe, needle sizes and volume injected. Criteria for administration of postoperative analgesics should be included. If neuromuscular blocking agents are to be used, the drug, dose, volume injected and route of administration should be listed.
2. Name, and qualifications of the personnel to perform and/or assist in the surgical procedure. The role and/or responsibility of each person should also be described (i.e. who will conduct the surgery, administer and monitor the anesthesia, and be in charge of the post surgery care).
3. Description of the use of aseptic techniques
  - a. Animal hair removal and disinfection of the operative site  
(Ex.: use of clippers and betadine to prepare the region for surgery)
  - b. Use of sterile gloves, mask, cap, surgical scrub

- c. Method used for sterilization of instruments, supplies and implanted material. An explanation on how sterilization was monitored should be included.
  - d. Operative techniques to reduce the likelihood of infection.
4. Description of the surgical procedures:
- a. Incision location and length (Ex.: dorsal, ventral or dorso lateral, 2 cm, etc...)
  - b. # of blade (Ex.: #10, #11, etc...)
  - c. Organs *or tissue* involved (kidneys, lungs, spinal cord, eyes, etc...)
  - d. Type and number of suture material to be used (Ex.: silk #4, wound clips, etc...)
  - e. Method of skin or wound closure (Ex.: three layers closure)
  - f. Type of suture pattern to be used (continuous or interrupted)
5. Perioperative care:
- A. Preoperative:
    - a. Animal health assessment with a visual examination and laboratory examination if indicated (alert, normal, lethargic, secretions, chest wall movement to determine respiratory rate, etc...).
    - b. A period of animal stabilization to a new environment (mention the location where the surgery will be done) before undergoing surgical procedures. (Ex.: place the animal in the surgery room for at least 20-30 minutes before the procedure)
    - c. Preoperative fasting of a specified duration if indicated for the procedure or species to be used (it needs to be justified if it is more than 12 hours).
    - d. Description of preoperative medications or antibiotics (dose, frequency, route) if needed.
  - B. Intraoperative:
    - a. Description of monitoring anesthetic level and vital organ functions; name of person administering and monitoring anesthesia (Ex.: adequate level of anesthesia will be maintained by monitoring arterial blood pressure, respiration rate [chest wall movement], corneal reflex, and/or hindlimb withdrawal to toe pinch)
    - b. Providing vital organ support such as parenteral fluid administration, oxygen and maintenance of body temperature.
    - c. Proper surgical technique which comprises:
      - i. Gentle tissue handling
      - ii. Effective homeostasis (Ex.: techniques to be used if excessive blood is expected)
      - iii. Maintenance of sufficient blood supply to the tissues (Ex.: use of fluids, blood transfusions, etc...)
      - iv. Asepsis
      - v. Accurate tissue apposition (proper wound closure)
      - vi. Proper use of surgical instruments (sterilized, blunt if used inside body cavity)
  - C. Postoperative:
    - a. Monitoring temperature, cardiovascular and respiratory function
    - b. Monitoring of the surgical incision (Ex.: Check for signs of infection, improper wound closure, use of antimicrobial agents like betadine at the incision site)

- c. Thermal support to combat hypothermia (Ex. use of a heating pad for a period of time after surgery)
  - d. Administration of analgesic for postoperative pain (Ex. Buprenorphine: dose, frequency and route)
  - e. Administration of prophylactic antibiotics and other drugs (dose, frequency, duration and route)
  - f. Suture or clips removal (usually 8-10 days postoperatively)
  - g. Recovery area (recovering rodents should be housed individually to prevent injury by cagemates. Although extensive monitoring may not be possible, the animals should be frequently observed until recovered from anesthesia and adequately stabilized before being returned to their home cages)
  - h. Monitor mobility and behavior of animal
6. Indicate expected health changes or possible complications and describe methods of care (Ex.: animal would not be able to walk in a day, bladder needs to be expressed, etc...)
  7. During major operative procedure on multiple rodents, care must be taken to avoid contaminating one animal from another. New sterile gloves should be used and preferably separate sterile surgical instruments provided for each animal subject. When a limited number of instruments are available, at least, the investigator should use a glass bead sterilizer to sterilize instrument tips between animals.

#### **VI. Non survival Surgery**

1. Aseptic techniques or dedicated surgical facilities are not required when performing non survival surgery. The area to be used should be clean, free of clutter, and prepared using acceptable veterinary sanitation practices as would be used in a standard examination/treatment room. Professional judgement is necessary to evaluate the probability of virulent bacterial contamination and subsequent host responses that would invalidate research results. However, the type of anesthetic and analgesic to be used in the animal should be well established in the IACUC protocol (dose, volume and route) and the surgical site should be clipped before animal disposition.

#### References:

- 1) The Guide
- 2) AWA
- 3) PHS Policy
- 4) The IACUC Handbook