Background: Survival surgical procedures on all vertebrate species must be conducted using aseptic technique. This means instruments and supplies used during the surgery are sterile.

In considering methods for sterilization procedures, it is important to differentiate between sterilization and disinfection. Sterilization kills all viable microorganisms while disinfection only reduces the number of viable microorganisms. High level disinfection will kill most vegetative microorganisms but will not kill the more resistant bacterial spores. Commonly used disinfectants such as alcohol, iodophors, quaternary ammonium and phenolic compounds are not effective sterilants and are therefore not acceptable for use on items intended to be used in survival surgical procedures.

The preferred methods of sterilization are high pressure/temperature (in autoclaves) for items that can withstand high temperature and ethylene oxide gas for items that cannot withstand high temperature. When required, approved cold chemical sterilants may also be used.

Policy:

**High pressure/temperature steam sterilization:** Many instruments, drapes and implants can be sterilized in an autoclave. Items should be double wrapped or placed in autoclave pouch, and an appropriate sterilization indicator should be included in the pack. Sterile packs may be stored for up to 6 months. The date of sterilization should be indicated on the pack.

**Gas sterilization:** Ethylene oxide (EO) gas is frequently used to sterilize instruments that cannot tolerate heat, such as plastic tubing and telemetry devices. As with autoclave items, a double wrap or placed in EO permeable pouch, and appropriate indicator should be used. Sterile packs may be stored for up to 6 months. The date of sterilization should be indicated on the pack.

Please contact the Department of Comparative Medicine (DCM) on the Central and Waterfront Campus, or Surgical Services Unit (SSU) on the West Campus with any questions or requests for assistance regarding sterile pack preparation.

**Chemical Sterilization:** Instruments and supplies that cannot tolerate heat can also be sterilized using chemical agents. Certain chemicals may be used for cold sterilization, providing the following guidelines are adhered to:

**Guidelines for cold (chemical) sterilization:**
- Chemicals must be classified as "sterilants." Those classified only as "disinfectants" are not adequate.
- Endoscopes and other heat-intolerant instruments that may be used in multiple surgeries in a day may be treated with a high-level disinfectant (such as ortho-phthalaldehyde, or OPA) following meticulous cleaning in between procedures.
- The object to be sterilized must be relatively smooth, impervious to moisture, and be of a shape that permits all surfaces to be exposed to the sterilant.
- All surfaces, both interior and exterior, must be exposed to the sterilant. Tubing must be completely filled and the materials to be sterilized must be clean and arranged in the sterilant to assure total immersion.
• The items being sterilized must be exposed to the sterilant for the period of time prescribed by the sterilant manufacturer.
• The sterilant solution must be free of contamination and debris, and within its expiration date or shelf life. Most sterilants come in solutions consisting of two parts that when added together form what is referred to as an "activated" solution. The shelf life of activated solutions is indicated in the instructions for commercial products. Generally, this is from 1-4 weeks.
• Prior to contact with animal tissue, chemically sterilized items must be thoroughly rinsed with sterile water because residual sterilant may cause severe tissue necrosis.

Examples of acceptable chemical sterilants:
• Cidex – The active ingredient in Cidex is 2% glutaraldehyde. The manufacturer’s instructions indicate that a minimum of 10 hours is required for sterilization. Cidex comes in two formulations which are Cidex and Cidex-7 (long-life). The shelf lives of activated Cidex and Cidex-7 are 14 days and 28 days, respectively.
• Sporicidin – The active ingredients in Sporicidin (activator plus buffer) are phenol (7.05%), glutaraldehyde (2%), and sodium phenate (1.2%). The manufacturer's instructions indicate that 6 ¾ hours are required for sterilization. The shelf life of the activated solution is 28 days.
• Alcide – The active ingredient in Alcide is 1.37% sodium chlorite. The manufacturer's instructions indicate that a minimum of 6 hours is required for sterilization. The shelf life of the activated solution is 14 days.
• Glutaraldehyde (2%) for a minimum of 10 hours.
• Formaldehyde (8%) - Alcohol (70%) solution for a minimum of 18 hours.
• Stabilized hydrogen peroxide (6%) for a minimum of 6 hours.

**Bead sterilization:** If multiple rodent survival surgeries are planned for a given day, the surgical instrument pack must be initially sterilized via autoclave, gas sterilization, or proper cold sterilization. In between surgeries, instruments may be cleaned, and a bead sterilizer or other form of heat sterilization may be employed to sterilize the tips. A bead sterilizer should not be used for survival surgery in non-rodents.