Batch Surgery

- Rodents are typically done in larger numbers or “batches” of animals to provide the statistical ‘n’ needed for a given model.
- Often, these numbers preclude the ability to provide separate instrument packs for each animal.
- Rodents undergoing survival surgery are treated the same way as any other larger species in that the rules of asepsis apply.
Considerations of “batching”

Shared instruments and supplies are common when performing batch surgeries.

- Asepsis **must** be maintained throughout the procedure and **must** be regained between animals.
- Anesthetic induction, recovery and monitoring methods, and analgesic considerations are as important as with other species!
- See Academy of Surgical Research: http://www.surgicalresearch.org Training Materials/White Papers
How Many Surgeries Per Pack?

This will vary depending on the project and the surgeon’s skill.

- General guidelines -
  - Is it major or minor surgery? Minor surgeries may allow for more animals per pack.
  - Is the procedure long? Longer surgeries mean increased exposure of the tissues, which can lead to higher risk. Therefore, less animals are suggested per pack.
  - Is the surgeon skilled or novice? More experience supports better tissue handling skills and faster open-to-close times, allowing an experienced surgeon to perform more surgeries per pack.
Preparation of the Instruments

- **ALL** instruments must be sterilized prior to use.
- The following are acceptable methods:
  - Steam – follow manufacture’s recommendations regarding time, temp and pressure.
  - Chemical – follow manufacture’s directions regarding solution concentration, contact time and appropriate rinse technique.
  - Gas – follow manufacture’s directions regarding exposure time, rinse (if needed) and pack contents.
- Identify ALL supplies needed for surgical prep, peri-operative use and post-operative support:
  - supplemental heat source, gloves, tape, prep solutions, suture, etc.
- Identify disposable supplies you will need:
  - cotton tipped applicators, gauze, drapes, staples, etc.
- Identify project-specific consumables you will need:
  - appliances, catheters, needles, syringes, screws, drill bits, etc.
Planning:

- Supplemental heat sources
- Sterile gloves & Sterile fields
- Drape materials & “Seal Packs”
- Prep items, analgesics, tape
- Suture, glue, Steri-Ops
- Supplemental heat sources
Plan it out

May need *multiple* packs:

- Autoclaved pack may contain instruments, etc.
- Gas or Cold sterilized pack may contain devices, catheters, electronics, etc.
- Additional “Extras” Pack containing already sterilized items (suture, steri-op drapes, etc.), or items that need only their external surfaces sterilized (Hydrogen peroxide, dental cements, tissue & device glues, etc.). This helps with organization of surgical station and ensures all supplies are present.
Main Pack (autoclave)

- Gather instruments, supplies, drapes, etc.
- Arrange atop absorbent chux pad, sitting atop a paper drape (blue).
- Fold and slip inside “Seal N Peel” pack.
- Mark with name, date and pack type (e.g.: “cath pack”)
“Extras” could be extra syringes, needles, supplemental heat source, roll of tape, conical tube of hydrogen peroxide, etc..

- Sprayed w/ Clidox in hood and allowed to sit 15min prior to packaging
- We also expose to UV light prior to packaging
- These items will be held in the secondary sterile zone of the surgical field and handled minimally.
Setting the Stage

- It is important to set up the surgical station prior to beginning any manipulations of an animal.
  - Place warm water blanket & bead sterilizer in position and allow to warm up.
  - Position lights, equipment and nose cones in anticipated places.

- Keep airflow and traffic to a minimum around the surgical station.
Ways to Minimize Contamination Between Animals

- Wipe down ALL surrounding surfaces and associated equipment with Clidox® or similar material.
  - Counters, hood surfaces, lights, bead sterilizers, stereotaxic units, drills, anesthesia machine, etc.

Here we wiped down 1st with Sporicidin, then followed with Clidox. MUST be rinsed off w/saline following use!
Additional Equipment:

- Stereotactic Units & Systems, Drills, Radios, etc.
  - Wiped down Clidox soaked towlettes
Additional Equipment:

- Stereotactic Units & Systems, Drills, Radios, etc.
  - Wrapped in sterile stockinet

Stockinet is rolled & autoclaved

Stockinet is rolled over drill

Steam autoclaved drill bit is attached. Drill bits should be bead sterilized between animals – use hemostats to completely submerge.

*User is wearing sterile Nitrile gloves
Opening the Pack

- Place the pack within the field by opening & discarding the outer Seal N Peel pack
- Open the pack’s paper layer & carefully, handling by the undersides/corners, unfold both of these inside layers
- Slide absorbable chux material to one side (provides a place for instruments to drain post re-sterilization), leaving the blue ‘paper’ as the main surgical site
Opening the Pack

- Open a sterile drape as a secondary sterile “drop” zone to open cold sterilized items onto (“extra’s pack” contents too)
  - devices, glues, injectables/project compounds, hydrogen peroxide, supplemental heat source, etc.
- Items such as drills and radios may be wrapped in stockinet or wiped/wrapped and placed here as well
Setting the Stage

- Open any needed sterile items (e.g., suture, needles, syringes, Op-site drapes) not in the pack and drop within the sterile field.

- Don **sterile** gloves

Note: sterile gloves should be changed/replaced whenever asepsis is broken.
Setting the Stage

• With sterile gloves, empty bowls of contents and place face up.
• Arrange equipment, supplies and instruments in a manner that facilitates aseptic technique.
• Fill bowl(s*) – with saline or sterile water
The "Two Bowl" System

- Sterile saline is used to cool/rinse the instruments AFTER bead sterilization.
  - The bowl is also used to "store" instruments until needed for the next animal.
  - Kept submersed, instruments are less susceptible to contamination by airborne particulates, and are less likely to be pushed into a non-sterile area or accidentally dropped.

- The other bowl may be used for storing additional supplies, small parts, or seldom used/extra instruments **OR** can be filled with sterile water for cleaning purposes.
“Two Bowl” System
(saline & sterile H₂O)

- Second bowl may be filled with sterile water.
- Water is better able to lyse blood cells and aids in removal of fat, and is used PRIOR to placing instruments in the bead sterilizer.
- While recommended, the 2nd bowl is not “required”; however one must ensure blood/tissue is removed prior to bead re-sterilization (high degree of difficulty removing organic material once super heated in the beads).
“Two Bowl” System
(saline & storage)

- Note the use of blue "chux" pad as inner layer to absorb fluids.
- One tray holds extra items such as gauze, small parts or extra/seldom used instruments.
- One tray holds the instruments.
Use of “Placemats”

- Note the overall arrangement of the field.
- Note the use of paper towels as “place mats”
- Placemats are removed with each animal so that contaminants, blood and loose fur are also removed between animals.

Additional heat source has been cold sterilized and covered with the “place mats”
Set up a central prep station remote from the surgical station to prevent contamination.

Ensure scrub soap, alcohol wipe & betadine paint are available.
- individual wipes or larger volume dispensers.

Use of clippers or Chemical hair removal.

Pre-emptive analgesics must be provided.
Surgical Scrub

- Area is clipped well beyond intended incision site.
- Rodents require a minimum of three surgical scrubs, using a germicidal soap, alternated with alcohol wipe and followed by final iodine paint.
- Start in the center and spiral outwards, or work unidirectional in extremely small sites.
Positioning for draping

- Following three scrubs and final betadine paint, move animal to surgical station.
- Position animal, as appropriate, for surgical approach and procedure.
- Take care not to touch area that has been surgically prepped.
Animal is positioned PRIOR to donning sterile gloves.

- Position and secure gas nose-cone, intubation tube or tooth bar.
- Position the light source and or other equipment.
- Place ear bars if in stereotactastic device.
- The surgeon then dons sterile gloves for draping the animal.

Incision site = 5mm
Prep site = 1.5cm x 1.5cm
Mouse prepped/positioned

Final drape

Note the use of both a paper drape and a “sticky drape” (Steri-Op)
Mouse draped and in position within surgical field

- Paper drape only
- Paper drape & “sticky drape” (Steri-Op)
Following completion of the procedure, the animal is removed to recovery area and the surgical site re-set.

Here the animal is being lifted by the underlying placement with the drape still in place (removed prior to placement in recovery cage).
Instrument tips re-sterilized

- Instruments of like size and function are placed in the bead sterilizer together.
- No more than 3-4 instruments should be in bead sterilizer at any one time.
- Instrument contact-time in bead sterilizer is ~15 seconds.
- Then placed in saline bowl to cool until next case.
• Recovery cage lined in paper (not bedding).
• Heat source controlled or ambient (e.g.: cannot continue to heat beyond body temperature or one that cools naturally).
• Fluid therapy per protocol.
• Analgesics per protocol.
• Help with accessing food & water post operatively (food on cage bottom, or supplemented with high calorie soft foods).
Post-Op Considerations

- Once sternal and capable of purposeful movement, the animal is returned to its home cage.
- Heat source may be beneficial during this stage, but should be removed prior to returning an animal to its holding room.

Home cage with water filled glove
Post-op mouse w/food on cage bottom
Thanks to the researchers who so graciously let us photograph their models!!

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