DLAR Post-Surgical Monitoring and Record Keeping

Updated April 2026

Purpose

The purpose of this workshop is to inform and instruct personnel of the required monitoring of post-surgical animals, and the required record keeping involved

This workshop will cover the basics of post-surgical care, monitoring, and record keeping, as well as offer resources for further learning or assistance

Post-Surgical Anesthetic Recovery

Begins at the completion of the surgical procedure. Continues until the animal has substantially recovered from the anesthetic effects. This is indicated by the ability to rise, walk, and ambulate normally. Animals must be observed during this period and may not be returned to the animal holding room unattended.

- Clean, dry area
- Monitored every 5-15 minutes, or per your IACUC protocol
- Post-operative pain or discomfort

Additional care may be warranted

- Administration of parenteral fluids
- Analgesics and other drugs
- Care for surgical incisions
- Maintenance of appropriate medical records (Guide pg. 119)

Post-Surgical Anesthetic Recovery Monitoring

Similar to surgical monitoring

- Temperature
- Pulse/Heart Rate
- Respirations/Respiratory Rate

Animals coming out of anesthesia can be unpredictable

- Bite
- Scratch
- Vocalize

Vitals should be monitored and recorded every 5-15 minutes.

This should be described in the IACUC protocol

Thermoregulation During Post Surgical Anesthetic Recovery

Animal *must* be on heat source until fully recovered

- Recirculating water pad
- Heating pad
  -cage placed half off the pad, so recovering rodent can escape the heat
- Heat lamp (not recommended)
- Bair Hugger
- Microwaveable heat sources
- Body heat wraps
- Slide warmer

Vital Signs

Temperature

- Take about every 10 minutes during recovery
- Species dependent

Heart Rate

- Take pulse for 10 seconds, multiply by 6 for BPM
- Fast HR can indicate pain or distress

Respiratory Rate

- Slow RR indicates sedation
- Fast RR indicates pain or distress
- Open mouth breathing, pronounced chest movements indicate respiratory distress

Skin color – cyanotic, pale, congested mucous membranes or skin

Take readings and record as dictated in IACUC protocol

Return to Facility

Animals must be observed during the anesthetic recovery period, and may not be returned to the animal holding room unattended. Substantial recovery from anesthetic effect is indicated by

- Ability of animal to pull itself into sternal recumbency from a lateral position
- Ability to ambulate normally
- Do not place a sedated animal back in a cage with an awake animal

Post-Surgical Recovery

Begins as soon as the animal has substantially recovered from anesthesia. Continues until surgical site is healed.

- Usually 7-10 days (dependent upon the procedure)
- Or until sutures are removed

Monitoring should include

- Attention to basic biologic functions
- Behavioral signs of pain
- Signs of infection
- Incision dehiscence
- Bandaging as appropriate
- Removal of skin sutures, clips, or staples (Guide pgs. 119-120)

Maintaining complete post-surgical monitoring records is a Regulatory Requirement

What to Lookout For

- Vital Signs
- Temperament
- Behavior
- Vocalization
- Posture
- Edema or Bleeding
- Bedding
- Body Condition Score
- Eating & Drinking
- Urinating & Defecating
- Hydration Status
- Grooming
- Incision
- Cage Mates

Temperament

Attitude

- Arousal
- Depression
- Awareness of surroundings

A change in temperament is a good indicator for pain medication

Behavior

Gross Observations
- Tremor
- Convulsion
- Circling
- Paralysis
- Head Tilt
- Coma

Activity Level
- Hypoactivity
- Hyperactivity
- Restlessness
- Lack of Inquisitiveness

Observations without disturbing the animal
- Spontaneous vocalization
- Self Trauma
- Isolation from Cage Mates

Observations made while animal is disturbed or prodded
- Provoked vocalization
- Hiding
- Aggressiveness
- Minimal response

Vocalization

Vocalization can indicate

- Pain
- Distress
- Discomfort

Vocalizing is a good indicator to give pain medication

Teeth grinding in pigs, rabbits, sheep, and mice can also indicate pain

Posture

Hunched back
Tucked abdomen
Prostrate
Head tucked down
Head-pressing

Gait

- Ataxia
- Lameness
- Action of each Limb
- Position of tail when ambulating

Edema or Bleeding

Some swelling or discharge from the incision is expected

When to be concerned/Notify Vet Services

- Discharge continues more than 24 hours post surgery
- Swelling continues for more than 3 days
- Wound looks ‘angry’ – red, inflamed, swollen

Bedding

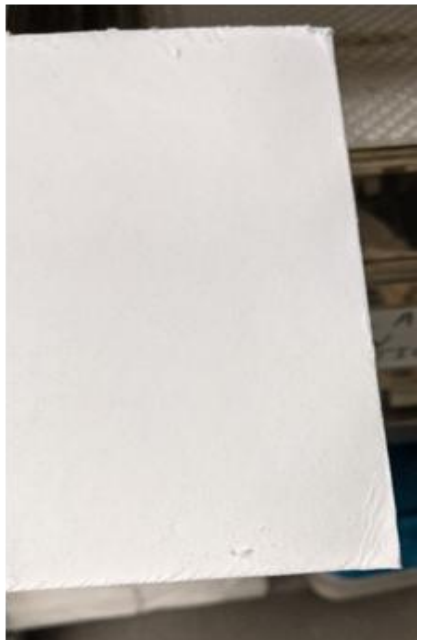
Several types available

- Sani-chips
- Envirodri
- Paper towels
- Pelleted Paper Bedding
- Diamond Soft Bedding
- Corn cob Bedding
- Alpha pad

Rats (especially Sprague Dawley) given buprenorphine tend to ingest Sani-chips bedding, which can cause breathing issues or gastric obstruction. Use an alternative bedding in these instances, or go without bedding.

Bedding Examples

Alpha pad



Pelleted paper bedding

Envirodri

Sanichips & Nestlet

Corn cob bedding

Diamond Soft Bedding

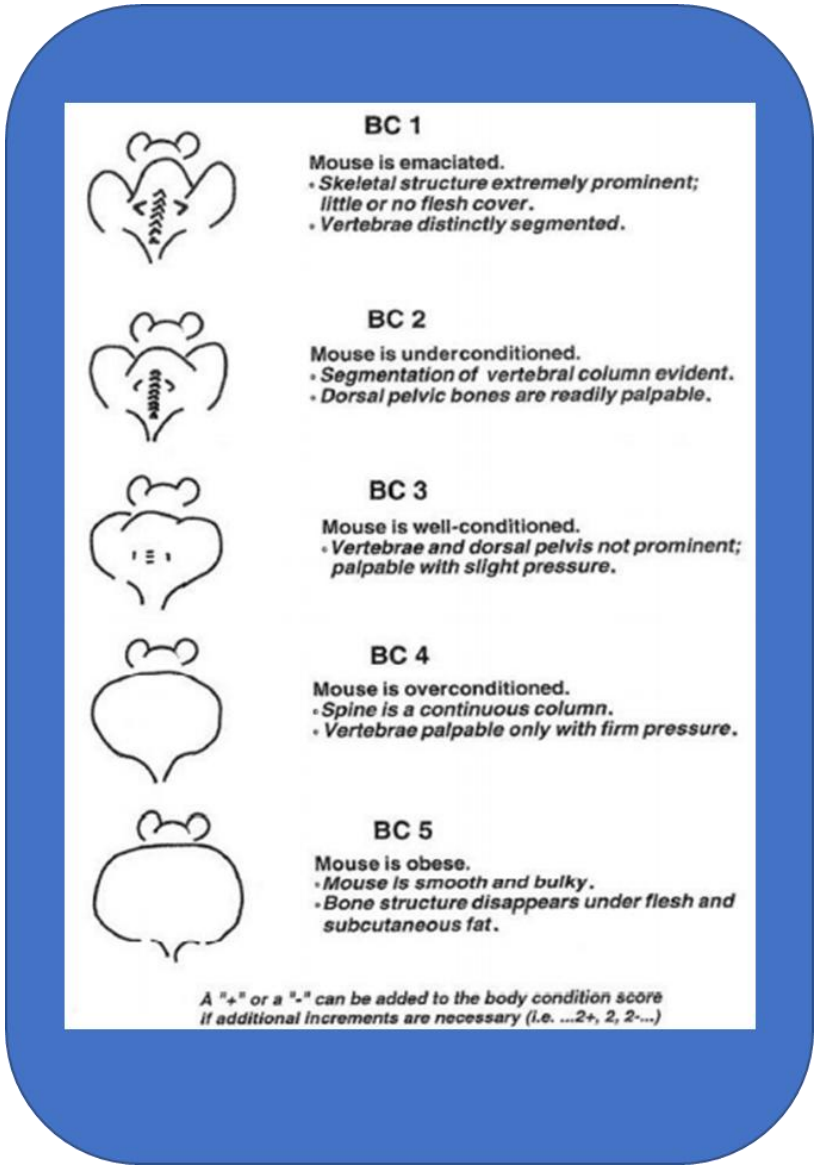
Eating and Drinking

Stressed out animals can easily become dehydrated and decrease in body weight

Assessing Hydration:

- Sluggish behavior
- Skin tent
- Hair coat
- Eyes (clarity, shape/position in orbit)

Body Condition Score



Graphic taken from Fig.1 of: Ullman-Cullere, M.H. and Foltz, C.J. Body Condition Scoring: A Rapid and Accurate Method for Assisging Health Status in Mice. Lab. Animal Science; 49 (3) 319-323, 1999.

Skin Tent Test

- Gently pinch and lift the loose skin between the shoulder blades
- Release and observe who quickly the skin returns to the body
- A well-hydrated animal will have the skin return quickly (under 2 seconds), while a dehydrated animal will take longer

Treating Dehydration in Mice

Subcutaneous administration of fluids

- 2-3 mL/mouse per day, 1.0-1.5 mL given twice
- LRS, 0.9% saline, dextrose/saline

Reassess dehydration in 8-12 hours

Therapeutic fluids should be warmed prior to injection

Supplemental Options

- Diet Gel
- HydroGel

Treating Dehydration in Rats

Calculate the fluid replacement volume:

Body weight (grams) x % dehydration (as decimal) =
Fluid volume (in mL) per 24 hours
Example: 250g x 0.1 = 25mL

If not drinking, add this to the 24 hour maintenance requirement

Calculate maintenance requirement:

Body weight (kg) x 100mL = Fluid volume (mL) per 24 hours
Example: 0.25kg x 100mL = 25mL

Split the dose: give 5mL per dorsal site (2 sites) and repeat several times throughout the day due to limited SQ space in the rat.

Nutritional Support

In the first couple of days post surgery, negative nitrogen balance and decreased eating is common

Recommend subsidizing with:

- Peanut butter
- Fresh fruit
- DietGel/HydroGel
- Baby rice cereal
- High protein/high fat drink
- Bacon softies
- Fruit crunchies
- Dough diet

Urinating and Defecating

Urine and fecal output indicate an animal is eating and drinking

Urine and feces also help to determine health problems

- Blood in urine/stool
- Concentrated urine
- Absence of urine/stool

Grooming

Rough hair coats can indicate an animal is not grooming

- Fur and skin unkempt, greasy or dull fur
- Porphyrin staining around eyes and nostrils
- Soiled anogenital area
- Encrustation of eyes

Animals with rough hair coat can indicate

- Pain
- Distress
- Discomfort

Incision Care

Monitor discharge/swelling

Clean with saline when needed

Suture, Wound Clips
Watch for suture reactions
Remove 7-14 days after surgery

Dehiscence

Surgical complication in which a wound ruptures along a surgical incision

- Inadequate undermining (cutting the skin away from underlying tissues during surgery
- Excessive tension on the wound edges caused by lifting or straining
- Wound located on a highly mobile or high-tension area such as the back, shoulders or legs

Contact veterinary services for help and re-training on surgical procedures

Cage Mates

If multiple animals have surgery on same day:

- Monitor closely for over-grooming or autophagia
  - Autophagia – eating one's own flesh (common in rats with paralysis)
- Keep an eye on wound clips/suture
  - Cage mates might remove wound clips/suture or chew on incision

Intra-Operative Record

Items it Include:

- Medication given (time, dose, route/location)
- TPR (Temperature, Pulse, Respiration)
- Overall how surgery went
  - Excessive bleeding
  - Long anesthesia period
  - Miscalculation of pre-medication dose
- Any other pertinent information

Post-Operative Record

Minimum information required by IACUC;

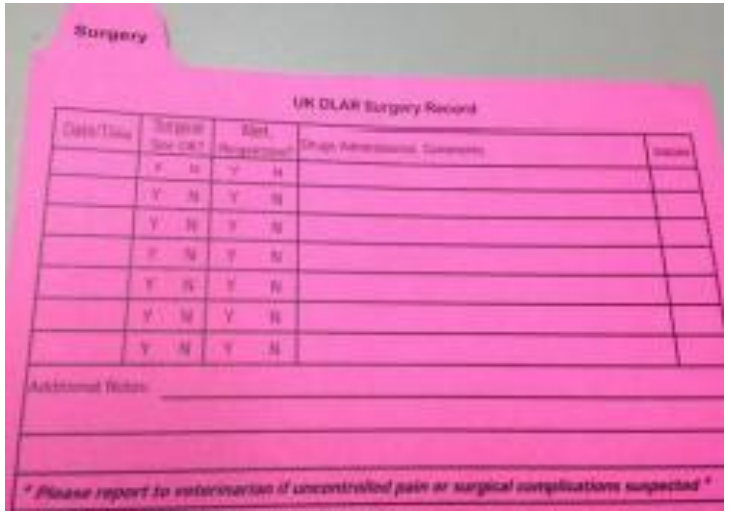
- Name of surgeon
- Date and time of procedure
- Procedure description
- Anesthesia used
- Post-operative medications and observations

Post-Operative Record Cont.

Helpful Information:

- Emergency contact person and phone number
- Date and time animal was last checked by lab
- Projected prognosis
  - Example – animal will have paralysis
- Special needs
  - Example – animal will have difficulty reaching wire bar, place food on cage floor and give long tipped water bottle
- Place on body where injections were given

Surgical Records



Accurate record keeping is important

Pink Surgery Cards (supplied by DLAR)

- IACUC Requirement
  - See IACUC Policy 116
- Gives emergency contact info
- Handy for quick reference when Vet Services needs to contact lab
- Helps others know what is expected and what is abnormal

Surgical Notebooks

Are these Day 1 Post-Op Rats Okay?

Are these Day 1 Post-Op Rats Okay? Answer

The investigators believed this was normal for day one post-op because the animals were moving.
However, these animals appear distressed and are demonstrating the following signs:

- Head-pressing
- Lack of grooming
- Porphyrin staining
- Awkward positioning

Physical exam revealed:

- Low body temperature
- Hind limb weakness
- Anemia
- Pain
- Weight loss

Conclusion

This training course is NOT a replacement for a hands-on workshop

At this time, CEUs for IACUC requirements only apply to hands-on training

To schedule the DLAR Post Surgical Monitoring and Record Keeping (DLAR-WSHP-03) hands-on workshop or contact the DLAR Training Group

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Questions