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Post Procedural Care

An introduction to response planning for procedural problems and complicated animal models.

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Procedures

Many procedures in animal model development require post procedural care and monitoring:

**SURGICAL**
- Device development
- Thoracotomy

**ANTIBODY PRODUCTION**

**TUMOR MODELS**

**BEHAVIOR STUDIES**

**Water or food restriction protocols**
Planning the Correct Response

• What is the expected response from the animal to the procedure?
• Is the analgesics appropriate for the level and duration of pain?
• Are special husbandry procedures required?
• Is the assessment scheme easy to use and understand?
• Does the pain assessment monitor the effectiveness of analgesia?
Expected Pain Responses

Physiologic/nociceptive pain (acutely serves a protective role)
pinched, poked, pressure, heat, cold

Clinical pain
inflammatory
neuropathic

Pathologic pain (acutely serves a protective role)
can occur in the absence of stimulus
allodynia, hyperalgesia
## Expect Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Ear</td>
<td>General attempts to rub and scratch</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>More painful, loss of function, infection</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Loss of function, self mutilation</td>
</tr>
<tr>
<td>Thoracotomy</td>
<td>Very painful, decreased activity</td>
</tr>
<tr>
<td>Laparotomy</td>
<td></td>
</tr>
<tr>
<td>Injections</td>
<td>Degree of pain variable, depression, swelling or general loss of body condition.</td>
</tr>
</tbody>
</table>
Clinical Assessment of Pain
Chronic vs. Acute

ACUTE
• Guarding
• Crying
• Restlessness
• Abnormal positions
• Recumbency
• Licking, biting

CHRONIC
• Behavioral changes
• Appetite changes
• Loss of weight
• Change in reproductive behavior
Preemptive Scoring of Pain

- Identifies the source of the pain: somatic vs. visceral
- Expected intensity: mild vs. moderate
- Duration: good for perioperative analgesic strategies
  poor predictor of an individual’s response to procedure or therapy.
Pain Assessments

A numerical value for a set of observations.

> number the more = > pain and or distress.

Pain scales are subjective and there is observer error and bias.

Most effective in acute post surgical animals.

May not be useful in assessing pain and distress in acute disease conditions.
Behavioral Assessments

Behavioral changes can be subtle.
Sporadic observations may not reveal signs of pain.
Behavioral changes may not be what we expect.
- observer not familiar with the species
- species-specific pains scales only developed for rats
- genetic predisposition to tolerance
Physiologic Assessment

Most useful in monitoring effectiveness of anesthesia.

Physiologic responses could be due to other stressors.

- anemia
- fear
- anxiety

Physiologic data may be beneficial in the evaluation of chronic animal models (cardiac models).
Institutional commitment

frequent evaluations & insure that pain is assessed

Pain scales do not replace good physical examinations

Pain associated behavior should prompt analgesic therapy, regardless of pain score.

Treat for pain and observe results.

All scales have limitations.
### Species-Typical Signs of Pain Nonhuman Primates

NHPs show little reaction to pain, especially in the presence of humans. Thus, they might look well until gravely ill.

- Vocalization is unreliable expression of pain
- Huddling with arms across it chest
- ”Sad” facial expressions or grimace and glassy eyed
- Alter social attention for casemates (lack of grooming or attacks)
- Clenching of teeth, restlessness
- Refusal of food and water
Species-Typical Signs of Pain Dogs

- Less alert or quieter than normal, whimpering or growling without provocation

- Apprehensive when handled
  
  Apprehensive behavior can quickly change to aggressiveness. So use caution when assessing painful animals.

- Stiff movements or unwillingness to move

- Abnormal posture, biting, scratching at painful area

- Inappetence, shivering, and increased respiration with panting
Species-Typical Signs of Pain Cats

- Quiet
- Ungroomed appearance
- Creased forehead, eyelids slightly closed
- Separate themselves from the group or hide
- Stiff posture, abnormal gait
- Incessant licking of painful site. Touching the site may result in an immediate violent reaction and an attempt to escape.
Species-Typical Signs of Pain Rabbits

- Apprehensive, anxious or active with hunched posture
- Squeal or cry when touched
- Can show aggressive behavior
- Excessive scratching and licking
- Abdominal pain: grinding of teeth and excessive salivation
- Increased respiratory rate and reduced appetite
- Rabbits may cannibalize their young when distressed
Species-Typical Signs of Pain Rodents

- Laboratory Rodents
- Vocalization and aggression when handled
- Excessive licking or scratching of incision site
- Ungroomed appearance
- Twitching
- Back Arching/ Stretching
- Loss of appetite
- Porphyrin secretions
Care of Post Procedural Patients

Conduct surgeries when staff is available to monitor the first 72 hours of recovery.

The recovery protocol should be developed and discussed with all persons working on the protocol.

Post an information sheet listing the contact information for persons responsible for the care of the animals.

Remember to legibly document observations in the animal’s record.
Care of Post Procedural Patients

Normalization of homeostasis

Control of Pain

Early recognition of complications
Normalization of Homeostasis

IV fluid administration during the recovery period
  - may need to be extended until animals are able to eat and drink
  - fluids should be warmed to prevent hypothermia

Recovery area should be quiet and in an area that is frequented by staff

Animals should be rotated between left and right lateral recumbency until they are able to maintain sternal recumbency without assistance
Normalization of Homeostasis

During the recovery period the following parameters should be checked at least every 10-15 minutes and recorded in the animals clinical record:
- respiration
- pulse
- mucous membrane color
- return of reflexes
Things to Remember When using Analgesics

Preoperative analgesics minimize pain during recovery

Use multiple classes of analgesics to treat different parts of the pain pathway

When selecting and administering analgesics, consider both the duration of action and severity of pain
Recognition of Complications

Expected early complications may include:

- Hemorrhage
- Cardiac arrhythmias
- Increased intracranial pressure
- Increased intraocular pressure
- Vomiting, illus and gastritis
- Surgically-induced anorexia
- Electrolyte or endocrine imbalances

Expected late complications may include:

- Infections
- Device failures
- Self mutilation
- Cachexia
- Sudden Death
- Behavioral changes
- Reproductive complications
Problematic Protocols

In addition to expected post procedural complication some procedures are problematic because the model produces a disability

Spinal Cord Injury models
Congestive Heart Failure Models
Tumor Models
Osteoarthritis Models
Spinal Cord Models

The following concerns should be addressed in the post procedural plan.

- pain management
- bowel and bladder care
- body temp
- abnormal muscle tone
- positioning and range of motion
- hydration
- nutrition
Regardless of the type of model, the investigator must account of both expected and problematic events in the protocol.

Thus, planning for specialized care, extended monitoring, and early end points should be included in any animal protocol where either surgery or other potential debilitating or stressful procedure is planned.