



The intent of this standard operating procedure (SOP) is to describe methods of assessing pain, and mitigating pain by administration of analgesic medications. This SOP is intended for principal investigators and their staff, CARE staff, and any personnel who will monitor animals undergoing potentially painful procedures. This SOP is approved by the Institutional Animal Care and Use Committee (IACUC) and the Cornell Center for Animal Resources and Education (CARE). Any exemptions must be approved by the IACUC prior to its application.

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### 1. Introduction

- a. A procedure which would be expected to be painful if it was performed on a human must be considered painful to the animal.
- b. Whenever there is a question whether or not a procedure is painful, the animal should receive the benefit of analgesia.
- c. Provide analgesia at appropriate dose and frequency to control pain.
- d. Any deviation from this procedure must be justified by the investigator and approved by the IACUC.

### 2. Materials

- Analgesics
- Syringes
- Needles
- Sterile saline

### 3. Procedures

- a. Pain Recognition and Assessment
  - i. Adapt observation frequency to the protocol (minimum once a day).
  - ii. Start observing the animal from a distance, so the animal's behavior is not altered by the presence of the observer. Then observe the animal more closely.
  - iii. Look for any change in behavior. Report animals in pain to the CARE veterinary staff.

**NOTE:** The most reliable signs of pain and distress are changes in behavior. This implies a good knowledge of species and individual normal behavior by the observer.

- iv. Common clinical signs indicative of pain or distress are listed in the following table.

Species	Clinical Signs of Pain
<b>Rodents, rabbit</b>	<ol style="list-style-type: none"> <li>1. Avoidance, vocalization and aggressiveness (mainly if the animal cannot escape)</li> <li>2. Spontaneous activities are reduced. The animal is isolated from the social group</li> <li>3. Altered gait</li> <li>4. Hunched posture</li> <li>5. Pilo-erection</li> <li>6. Reduced grooming; dark-red stain around the eyes and at nostrils</li> <li>7. Reduced appetite and subsequent weight loss</li> <li>8. Increased respiration rate</li> <li>9. Failure to explore cage when disturbed</li> </ol>
<b>Cat, dog</b>	<ol style="list-style-type: none"> <li>1. Avoidance, vocalization, eyebrow movements, escape and aggressiveness</li> <li>2. Spontaneous activities are reduced. The animal is isolated from the social group</li> <li>3. Apathy, anxiety, plaintive</li> <li>4. Altered gait</li> <li>5. Nibbling, licking, scratching, rubbing</li> <li>6. Eyes are semi-closed</li> <li>7. Head shaking (ear pain)</li> <li>8. Reduced appetite and subsequent weight loss</li> </ol>
<b>Swine</b>	<ol style="list-style-type: none"> <li>1. Tolerate manipulations</li> <li>2. Lying down more frequently, immobile</li> <li>3. Aggressive vocalization and behavior</li> <li>4. Altered gait</li> <li>5. Increased muscle tension around the eye</li> <li>6. Pilo-erection</li> <li>7. Reduced appetite (sometimes)</li> <li>8. Reluctance to move</li> </ol>
<b>Ruminants</b>	<ol style="list-style-type: none"> <li>1. Vocalization</li> <li>2. The animal is isolated from the social group</li> <li>3. Lying down more frequently, immobile</li> <li>4. Apathy, depression</li> <li>5. Altered gait, lameness</li> <li>6. Increased respiratory rate (abdominal pain) or shallow respiration</li> <li>7. Cessation of rumination; teeth grinding, dorsal lip-curling (goats)</li> <li>8. Loss of appetite (partially or totally)</li> <li>9. Tucked abdomen</li> </ol>
<b>Birds</b>	<ol style="list-style-type: none"> <li>1. Inappetence</li> <li>2. Wasting</li> <li>3. Ruffled feathers</li> <li>4. Altered gait or posture</li> <li>5. Rapid open mouth breathing (panting)</li> <li>6. Dull eyes</li> </ol>
<b>Horses</b>	<ol style="list-style-type: none"> <li>1. Reluctance to handling (acute pain)</li> <li>2. Restlessness</li> <li>3. Anxious appearance with dilated pupils</li> <li>4. Ears drawn back, flat to head</li> <li>5. Rigid stance</li> <li>6. Profuse sweating</li> <li>7. Kicking at abdomen (abdominal pain)</li> <li>8. Flehman-like lip posturing</li> </ol>

## b. Analgesia Plan

- i. If possible, provide analgesia before the painful stimulus, as it is often more effective in preventing pain (e.g., give analgesic before surgery).
- ii. Use a combination of analgesics, which is often more effective than using a single agent. For example, combination of buprenorphine, ketoprofen, and local infiltration of lidocaine.
- iii. For surgical procedures, extend analgesia from pre-op. to 72 hours post-op., unless specified otherwise and approved by the IACUC.

## c. Local Analgesia

Infiltrate or apply local analgesic to areas where a painful stimulus may be induced. Repeat application of local agent at specified intervals to maintain analgesia. In some cases a sedative is recommended when using local analgesia.

Analgesic	Dose	Duration	Note
Lidocaine	1%–2% (10 mg/kg-20 mg/kg) ID, SQ, Topical	30–60 min.	Because this drug is acidic, a 1:1 dilution with sodium bicarbonate solution is recommended. Diluted solution is as effective but induction of analgesia is slightly prolonged.
Bupivacaine	0.125% (1.25 mg/kg) Topical	3–4 hr.	Same comment as for lidocaine
EMLA cream	Thick spread	30–60 min.	

## d. General Analgesia

**NOTE:** Any drugs below given simultaneously can be mixed in the same syringe without chance of precipitation.

Rat			
Analgesic	Dose	Frequency	Note
Buprenorphine	0.01–0.05 mg/kg SC, IP, IV	4–8 hr.	
Ketoprofen	2–5 mg/kg SC, PO	12–24 hr.	Do not administer after an adrenalectomy.
Flunixin	2.5 mg/kg SC	12–24 hr.	Do not administer after an adrenalectomy.
Acetaminophen	100–300 mg/kg PO	4 hr.	
Mouse, Hamster			
Analgesic	Dose	Frequency	Note
Buprenorphine	0.05–0.1 mg/kg SC, IP	4–8 hr.	
Ketoprofen	2–5 mg/kg SC	24 hr.	Do not administer after an adrenalectomy.
Acetaminophen	300 mg/kg PO	4 hr.	
Guinea pig			
Analgesic	Dose	Frequency	Note
Ketoprofen	2 mg/kg SC	12–24 hr.	Do not administer after an adrenalectomy.
Buprenorphine	0.01–0.05 mg/kg SC, IP	8–12 hr.	
Rabbit			
Analgesic	Dose	Frequency	Note
Buprenorphine	0.05–0.1 mg/kg SC	8–12 hr.	
Butorphanol	0.1–0.5 mg/kg SC, IM, IV	4–6 hr.	
Ketoprofen	2 mg/kg SC, IM, IV	12–24 hr.	

<b>Dog</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Buprenorphine	0.005–0.02 mg/kg SC, IM, IV	6–12 hr.
Butorphanol	0.2–0.6 mg/kg SC, IM, IV	4–6 hr.
Ketoprofen	2 mg/kg SC, IM, IV	12–24 hr.
Fentanyl	0.001–0.005 mg/kg IV	20–30 minutes
	0.003–0.010 mg/kg/h IV	continuous infusion
Morphine	0.1–1.0 mg/kg IM, SC, IV	4–6 hr.
Oxymorphone	0.05–0.20 mg/kg IM, SC, IV	2–4 hr.
Acetylsalicylic acid	10–25 mg/kg PO	8–12 hr.
Carprofen	4 mg/kg SC, IV, PO	24 hr.
Flunixin	1.0 mg/kg SC, IV	One dose
	1.0 mg/kg PO	24 hr. x 3 days

<b>Cat</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Buprenorphine	0.005–0.01 mg/kg SC	8–12 hr.
Butorphanol	0.4 mg/kg IM, SC	6 hr.
Ketoprofen	1–2 mg/kg SC, IM, IV	12–24 hr.
<b>Swine</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Buprenorphine	0.05–0.1 mg/kg SC, IM	8–12 hr.
Butorphanol	0.1–0.3 mg/kg IM	4–6 hr.
Ketoprofen	1–2 mg/kg IM	12–24 hr.
<b>Sheep, goat</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Buprenorphine	0.005–0.01 mg/kg IM, SC	8–12 hr.
Butorphanol	0.5 mg/kg SC, IM	4–6 hr.
Ketoprofen	1–2 mg/kg IM, SC	12–24 hr.
<b>Cattle</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Buprenorphine	0.005–0.01 mg/kg IM, SC	8–12 hr.
Butorphanol	0.5 mg/kg SC, IM	4–6 hr.
Flunixin	1 mg/kg IM or IV	12–24 hr.
Ketoprofen	1–2 mg/kg IM, SC	12–24 hr.
<b>Horse</b>		
<b>Analgesic</b>	<b>Dose</b>	<b>Frequency</b>
Butorphanol	0.05–0.075 mg/kg IV, SC, IM	4–6 hr.; Administer in combination with other drugs to avoid transient ataxia or excitement associated with administration alone.
Detomidine	5–6 µg/kg IV	IM (provides analgesic for ½–2 hr.)
Flunixin	0.25–1 mg/kg IM, IV	12–24 hr.
Ketoprofen	1–2 mg/kg IM, SC	12–24 hr.
Phenylbutazone	2–4 mg/kg PO	BID
Xylazine	1 mg/kg IV	–

Bird		
Analgesic	Dose	Frequency
Buprenorphine	0.01–0.05 mg/kg IM	8–12 hr.
Butorphanol	2–4 mg/kg IM	4–6 hr.
Ketoprofen	2 mg/kg SC, IM	12–24 hr.

#### 4. Safety

See [CARE SOP 707 Animal Related Injury](#).

#### 5. Contingencies

Emergency veterinary care is available 24/7. This includes after working hours, weekends, and holidays. For veterinary assistance, contact the CARE pager: 1-800-349-2456

#### 6. References

CARE SOP 707 Animal Related Injury

<http://www.research.cornell.edu/CARE/documents/SOPs/CARE707.pdf>

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