



The intent of this standard operating procedure (SOP) is to describe the steps taken for the treatment of dystocia in mice. This SOP is intended for use as a reference guide for CARE personnel, and is to be used in accompaniment with training. This SOP is approved by the Cornell Institutional Animal Care and Use Committee (IACUC) and the Cornell Center for Animal Resources and Education (CARE). Any exemption must be approved by the IACUC prior to its application.

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1. Introduction

Dystocia is defined as “difficult birth.”

2. Materials

- Sterile lubricant
- Dystocia cocktail (oxytocin, calcium gluconate, 0.9% saline/LRS, and ketoprofen)
- Needles
- Syringes
- Trimethoprim sulfadiazine (TMS/Bactrim)

3. Procedures

a. Initial assessment

- i. Determine the number of pups born alive and/or dead
- ii. Assess the dam’s condition as either:
 - Good (see flow chart 1, appendix 1): sleek, active, caring for/nursing pups
 - Bad (see flow chart 2, appendix 1): ruffled, dehydrated, dyspneic, prostrate, panting
- iii. Check to see if dam’s vaginal canal is open or not
- iv. Palpate the dam’s abdomen for pups (alive or dead)
 - Alive: abdomen round, symmetrical
 - Dead: abdomen lumpy and doughy
- v. Check the dam’s breeding history (or check breeding card) for:
 - The number of previous litters
 - Age of dam

- b. Determine treatment options
 - i. Determine treatment options based on the dam's condition as described above and the treatment options below.
 - ii. Principle investigator (PI) consultation/PI requirements
 - Notify PI that dam may be poor prospect for future breeding
 - Determine if PI wants to "save" dam, litter or both
 - iii. Litter condition as per abdominal palpation and shape
 - iv. Availability of foster dam

NOTE: Refer to the treatment options just below, flow charts 1 and 2 (appendix 1), and medications (appendix 2) to determine which treatment is appropriate for a given situation.
- c. Treatment options
 - i. Manually remove fetus from vaginal canal: apply sterile lubricant (e.g., KY or paralube) to pups and canal
 - ii. Administer dystocia cocktail **subcutaneously**
 - iii. Mix cocktail as follows:
 - (a) 1–1.5 IU of oxytocin (concentration: 10 USP/mL) [make a 2 unit/mL solution by diluting 0.1 mL oxytocin with 0.9 mL saline and (save the remainder for re-dosing later)]
 - (b) 0.3 mL of calcium gluconate 1% (make a 10 mg/mL solution by adding 0.1 mL of 10% Ca gluconate to 0.9 mL of saline or LRS)
 - (c) 0.1 mL of ketoprofen (1 mg/mL)
 - (d) 0.6–1 mL of saline 0.9%
 - iv. If no pups are expelled within an hour or so, the cocktail can be repeated **without** the ketoprofen
- d. Administer dystocia cocktail minus oxytocin
- e. Administer trimethoprim sulfadiazine (TMS/Bactrim) in water (consult with a CARE veterinarian before administering this medication): mix 1 mg Sulfa (0.2 mg trimethoprim) per each milliliter of drinking water for 7 days, shaking the bottle daily.
- f. Perform euthanasia
- g. Cesarean section: if foster mother is available, see [CARE SOP 611](#) Mouse Cesarean Section and Cross-Fostering
- h. Ovarian transplant

4. Safety N/A

5. Contingencies N/A

6. References

CARE SOP 611 Mouse Cesarean Section and Cross-Fostering:

<http://www.research.cornell.edu/CARE/documents/SOPs/CARE611.pdf>

Yale University Veterinary Clinical Services:

<http://www.med.yale.edu/yarc/vcs/dystocia.htm>

Nagy, Andras et al, eds., *Manipulating the Mouse Embryo: A Laboratory Manual*, Cold Spring Harbor Laboratory Press: Cold Spring Harbor, NY, 2003, 3rd edition

7. Appendix 1: Flow charts

Chart 1: Dam is in good shape

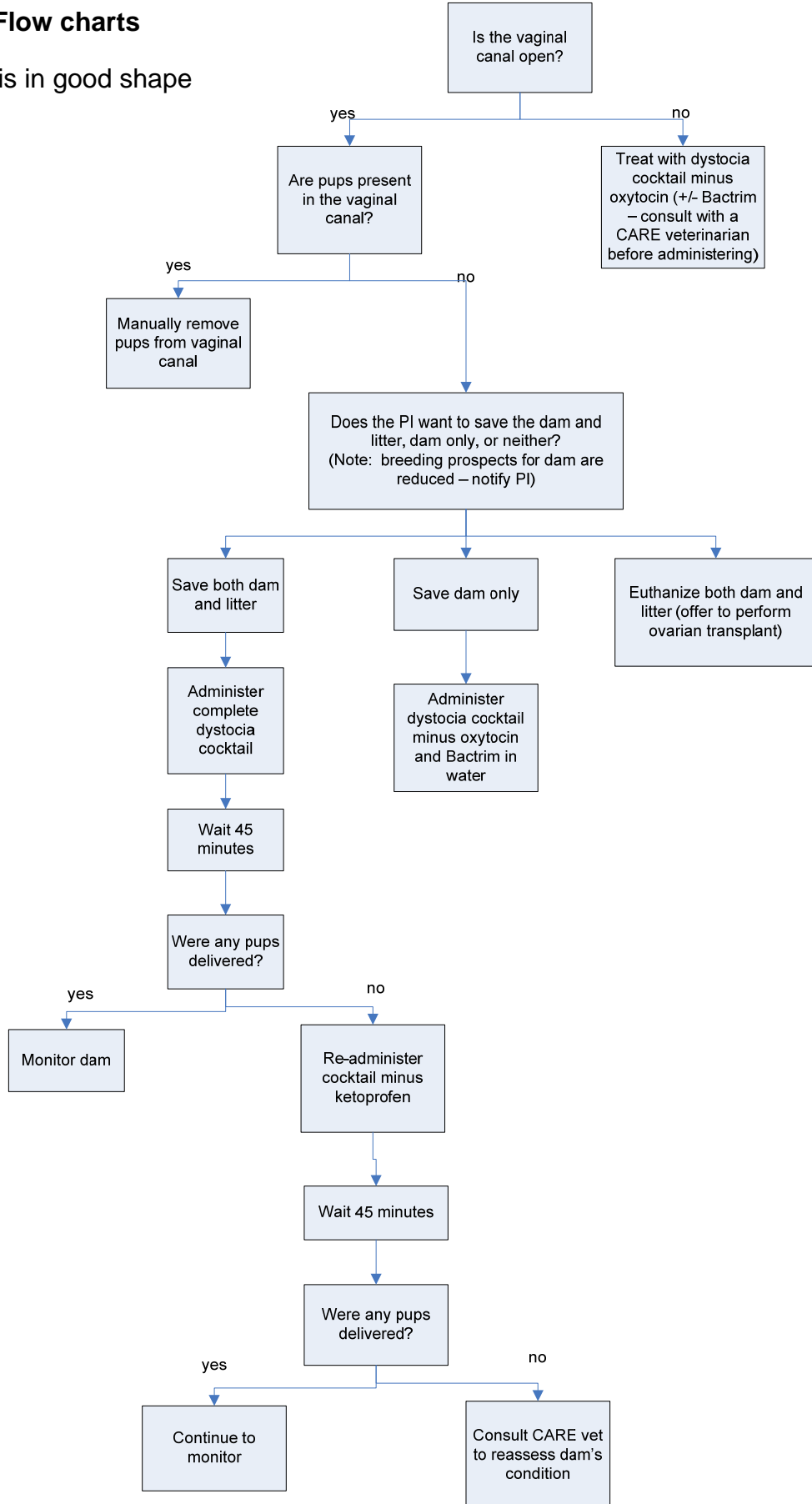
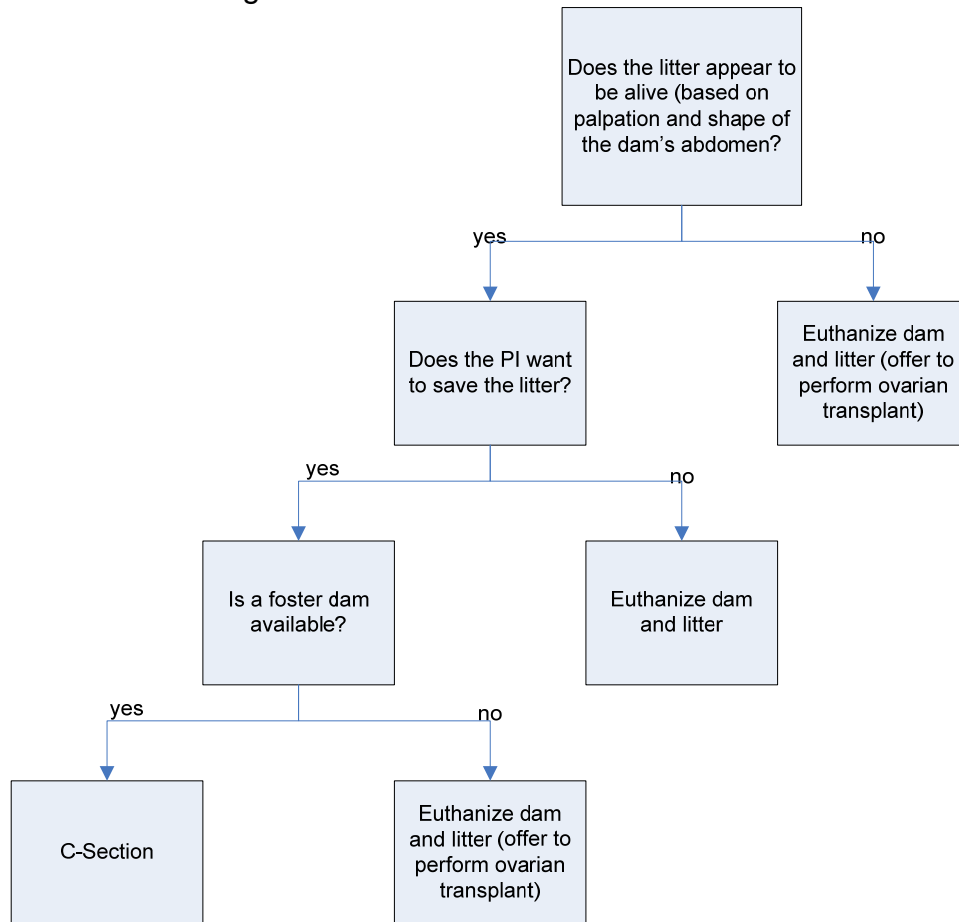


Chart 2: Dam is not in good condition



Appendix 2: Medications

- Oxytocin: increases the frequency of uterine contractions, therefore only administer if the vaginal canal is open.
- Calcium gluconate: improves the strength of contractions.
- Ketoprofen: non-steroidal anti-inflammatory drug that helps with potential discomfort or pain. Administer only once every 24 hours.
- Saline: corrects and prevents dehydration.
- Trimethoprim sulfa (TMS/Bactrim): antibiotic that can prevent secondary infection and toxemia. Administer if pups are still present in the abdomen 24 hours after the beginning of delivery.