

## **Alternative euthanasia methods during pentobarbital sodium shortage**



### **Introduction**

Due to disruptions in supply chains during the pandemic and a catastrophic incident at one of only two manufacturing sites worldwide, pentobarbital, the primary ingredient in euthanasia solutions and the preferred method for euthanasia of cats and dogs, is in short supply. It is unclear how long this shortage may last, though reports suggest that mid-2022 is possible.

While this is an issue that affects most veterinarians, it also greatly impacts animal shelters, particularly those with limited access to alternative methods of euthanasia. Unfortunately, there is no single alternative approach that will work for all situations. Each shelter will need to determine which combination of strategies can be employed to continue to operate throughout the duration of this shortage. Additionally, each shelter must consider laws impacting the practice of veterinary medicine in their state, as some treatments or adjunctive medications may require veterinary oversight. As with any new procedure, staff must be trained to use new substances or methods appropriately, so that euthanasia is performed humanely.

### **Strategies to extend current pentobarbital supply**

Priority should first be given to conserving the amount of pentobarbital used. Practitioners can avoid overdosing pentobarbital and instead use the minimal required dosage for intravenous euthanasia (1ml per 10lbs for a 390mg/ml solution). Verifying death through multiple methods may be useful in this case, particularly if practitioners do not typically use the minimum dosage during euthanasia.

Propofol is an anesthetic agent that acts synergistically with pentobarbital. If administered intravenously prior to pentobarbital for euthanasia, the amount of pentobarbital needed can be reduced by one half or more. Practitioners should be aware that the time to cardiac arrest may take longer when using reduced pentobarbital doses in conjunction with propofol than when using higher dose pentobarbital alone. Intravenous access is required to administer propofol. Suggested dosing varies. The lowest reported dosing starts at propofol 1.5mg/kg (or 0.7ml per 10 lbs body weight) and pentobarbital solution (390mg/ml) 29mg/kg (or 0.3ml per 10 lbs body weight); another protocol recommends administering propofol at 6.6mg/kg (3ml per 10 lbs) and pentobarbital at 43mg/kg (0.5ml per 10 lbs, or half the labeled dose). The AVMA does not recommend reducing the dose by more than 50%, though individual practitioners have reported success at lower doses when used in conjunction with propofol, specifically.

Any drug combination commonly used to induce anesthesia may also be used in conjunction with pentobarbital in order to reduce the pentobarbital dose, though without the synergistic effect of propofol, reducing the dose by more than half is not recommended. Examples of possible combinations include: tiletamine-zolazepam (alone or combined with

other agents), ketamine and midazolam, and ketamine and diazepam. All of these options involve the administration of controlled substances. Potential drug combination components that are not controlled include xylazine, medetomidine, dexmedetomidine, nalbuphine, and acepromazine. Gas anesthetic agents may be administered via mask following administration of a sedative or sedative combination to induce full anesthesia, though the potential staff exposure to unacceptable levels of inhaled anesthetics must be considered.

Because intraperitoneal administration of pentobarbital requires a higher dose than intravenous or intracardiac routes, one strategy to conserve is to avoid the intraperitoneal route when possible. Intracardiac injection requires an anesthetized or unconscious patient, though may be preferred if intravenous access is not possible. A variety of methods involving injectables, inhalants, or both can be used to achieve anesthesia, as discussed previously.

### **Potassium Chloride or Magnesium Sulfate**

Both potassium chloride and magnesium sulfate given intravenously or intracardiac are acceptable methods for euthanasia when administered to an unconscious patient. It is unacceptable to administer to a conscious patient, so a method of anesthetizing the animal must be available. Methods to achieve this are discussed in the previous section.

Suggested dosing:

- Potassium chloride: 1-2 mmol/kg, 75-150 mg/kg, or 1-2 mEq/kg
- Magnesium sulfate: 750-1000 mg/kg

Potassium chloride can be purchased commercially, or it is acceptable to create a compounded, saturated solution using granule materials purchased from chemical suppliers. Similarly, magnesium sulfate solution is available commercially, but it can also be compounded after purchase from chemical suppliers or is commonly available as Epsom salt. When compounding these drugs in fluid bags, it is recommended to add dye to prevent accidental use with other applications. Magnesium sulfate administration requires a much larger volume than practitioners may be expecting and both solutions may contain precipitates. It should be noted that even when used appropriately, animals euthanized with these salts may continue to display myoclonus or muscle fasciculations after death.

### **Ordering and Distribution**

Shelters and clinics are urged to only order the minimum amount of pentobarbital necessary to maintain operations. Stockpiling can exacerbate existing shortages. Facilities are also encouraged to communicate and collaborate with one another to distribute pentobarbital solution to shelters or clinics that are in need and unable to secure an adequate supply. DEA guidelines must be adhered to for transfer between licensees and for controlled substances logging.

### **Transparency and communication with municipalities**

Shelters are advised to communicate early with the municipalities they serve if a viable option for euthanasia is not possible given limitations on controlled substances, veterinary oversight, or anesthesia capabilities. As evidenced by drastic reductions in intake during the COVID pandemic, it is possible for communities to curtail intake and services during emergency situations and only take in those animals that urgently require assistance. Shelters may also

want to temporarily reconsider policies around providing owner-requested euthanasia if clients have access to other, affordable euthanasia options in their community.

**References:**

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Webinar: Pentobarbital Shortage - Alternative Protocols

<https://www.veterinaryeuthanasiaeducation.com/>