Euthanasia Reference Manual

THIRD EDITION



UF SHELTER MEDICINE ONLINE

Humane World for Animals™

Formerly called the Humane Society of the United States

Euthanasia Reference Manual

THIRD EDITION

Citation

Anderson CY, ed. Euthanasia Reference Manual. 3rd ed. The University of Florida; 2026.

Copyright & License

© 2026 University of Florida
This work is licensed under CC BY-NC-ND 4.0 International License. However, the author is open to granting permissions for translations. If you are interested in translating this work, please contact us at: VM-DistanceEducation@ad.ufl.edu



UF SHELTER MEDICINE ONLINE

Humane World for Animals™

Formerly called the Humane Society of the United States

Table of Contents

Acknowledgements iv

Forward v

CHAPTER 1:

Introduction 1
- **What is Euthanasia?** 1
- **Euthanasia, Past and Present** 1

CHAPTER 2:

Introduction to Euthanasia by Injection 4
- **Selection Criteria** 4
- **Policy Elements** 6
- **Volunteers and Euthanasia** 7

CHAPTER 3:

Introduction to Giving Injections 8
- **Syringes and Needles** 9

CHAPTER 4:

Animal Handling and Restraint 13
- **Typical Restraint Techniques – Dogs** 14
  - Restraint for Direct Injection 14
  - Restraint for Administration of Pre-Euthanasia Drugs 15
- **Typical Restraint Techniques – Cats** 15
  - Restraint for Direct Injection 15
  - Restraint for Administration of Pre-Euthanasia Drugs 16
- **General Restraint Techniques** 17
- **Restraint Tools** 17

CHAPTER 5:

The Euthanasia Room 23
- **Layout and Design** 23
- **Equipment and Supplies** 25

CHAPTER 6:

Pre-Euthanasia Drugs 28
- **Pre-Euthanasia Sedation** 29
- **Types of Pre-Euthanasia Drugs** 30
- **Administration of Pre-Euthanasia Drugs** 34
- **Inhalant Anesthetics** 36
- **Sodium Pentobarbital as a Pre-Euthanasia Drug** 37

CHAPTER 7:

Sodium Pentobarbital 38
- **How Sodium Pentobarbital Works** 38

CHAPTER 8:

Injection Routes for Euthanasia 42
- **Overview of the Injection Routes for Sodium Pentobarbital** 42
- **The Intravenous (IV) Route for Euthanasia** (Injection of Sodium Pentobarbital into the Vein) 44
- **The Intraperitoneal (IP) Route for Euthanasia** (Injection of Sodium Pentobarbital into the Abdominal Cavity) 58
- **The Intracardiac (IC) Route for Euthanasia** (Injection of Sodium Pentobarbital into a Chamber of the Heart) 62

CHAPTER 9:

Verifying Death 65
- **Verifying Death Requires Multiple Methods** 65
- **The Intracardiac Route of Verification is a Final Elected Option** (Apply this Verifying Death Technique ONLY After All Methods Have Been Used) 67

CHAPTER 10:

Body Disposal 69

CHAPTER 11:

Keeping People Safe 72
- **Accidental Exposure to Controlled Drugs** 73
- **Deliberate Exposure to Controlled Drugs** 74
- **Exposure to Zoonotic Diseases** (Disease Transmissions from Animals to Humans) 74
- **Exposure to Dangerous Animals and Dangerous Situations** 74
- **General Safety** 75

CHAPTER 12:

Controlled Drug Logs 76
- **Storage** 78
- **Record-Keeping Requirements** 80
- **Inventory Records** 80
- **Reporting Theft/Loss** 80
- **Training of Euthanasia Technicians** 81

CHAPTER 13:

Compassion Fatigue: Euthanasia and Occupational Stress 82

CHAPTER 14:

Owner-Intended Euthanasia 90

CHAPTER 15:

Euthanasia for Animals Other Than Cats and Dogs 93
- **Small Mammals** 93
- **Birds** 94
- **Reptiles** 95
- **Fish** 97
- **Amphibians** 97
- **Large Domestic Animals** 98
- **Wildlife** 99
- **Field Euthanasia** 101
  - Euthanasia by Injection 103
  - Euthanasia by Gunshot 104
  - Mass Euthanasia 108

Acknowledgments

The Euthanasia Reference Manual, originally published by Humane World for Animals (formerly the Humane Society of the United States), has served for more than two decades as a best practices guide for euthanasia in animal shelters. We are grateful to Humane World for Animals and to the original author of the manual, Rebecca H. Rhoades, DVM, for providing this invaluable resource for the animal sheltering community. Thank you to those veterinarians who served as collaborators and contributors —Dr. Wendy Swift, Dr. Martha Smith and Dr. Mark Jones—and to the current and onetime Humane World for Animals staff members who contributed to this and earlier editions. Finally, a special, heartfelt thank you to Douglas Fakkema and Inga Fricke for their commitment to improving animal welfare during the process of euthanasia by training certified euthanasia technician trainers. Their insight, input and mentoring have been invaluable to the trainers they taught.

- Cathy Y. Anderson, DVM, MS (Shelter Medicine), Maples Center for Forensic Medicine, University of Florida

- Todd Weissfeld, Instructional Designer, Maples Center for Forensic Medicine, University of Florida

Foreword

Performing euthanasia humanely is one of the most important and impactful skills we can develop to ease the suffering of animals. Because of the hard work of so many, euthanasia of pets in shelters has decreased significantly over the past five decades. Still, euthanasia will always be a necessary service to animals in shelters and in the community who need end-of-life care or who are suffering from serious medical or behavioral challenges that don't have a remedy. This manual discusses the process of euthanasia by injection, including how to set up the euthanasia room, administer pre-euthanasia drugs and humanely restrain an animal, as well as safety skills and record keeping. The first fifteen chapters provide a framework for euthanasia by injection; the last two (Chapters 16 and 17) provide a template for developing euthanasia technician skills.

We hope this manual helps you feel empowered and confident in your ability to meet the needs of the animals in your care, which may alleviate some of the compassion-based stress that animal shelter and animal services staff often feel.

- Lindsay Hamrick, M.S., CAWA, CPDT-KA, Director of Shelter Outreach and Engagement, Humane World for Animals

- Dr. Karen Hill-Sheppard

CHAPTER 1

Introduction: Understanding Euthanasia

What Is Euthanasia?

Euthanasia involves more than just taking the life of an animal. It is a process which combines compassionate and scientific consideration to provide each animal with a painless and stress free death. Along with the technical skills required to painlessly and humanely end an animal's life, there must be compassion and a sense of solemnity, reverence, and respect for the animals. Humane euthanasia of an animal requires five basic elements:

1. Compassion;
2. Knowledge;
3. Technical skills developed through training and experience;
4. Appropriate application of the most state-of-the-art drugs, equipment, and techniques currently available; and
5. Wisdom to know when euthanasia should, and should not, be performed.

This manual will bring these five attributes into focus so that those entrusted with the care of sheltered animals have the knowledge, skill, equipment, and insight to serve their needs, even when this means ending their suffering through euthanasia.

Euthanasia, Past and Present

Euthanasia, simply defined, is "the act of inducing a painless death." The word itself comes from the ancient Greek—eu- + thanatos ("good death"). Providing a "good death" for shelter animals whose lives must be ended should without a doubt be uppermost in the minds of those entrusted with the task.

In the nineteenth and early twentieth centuries, long before pain-free methods of ending life were available and when the primary reason for destroying dogs and cats was not overpopulation but the control of rabies, such a goal was virtually unattainable. As the threat of rabies and other diseases diminished, the population of domestic pets skyrocketed, and with increase in numbers came various methods for the elimination of homeless animals; sadly, humane considerations were often secondary.

Over the years, many techniques were tried in search of "better" means of ending the lives of homeless animals. Tragically, drowning was one of the earliest methods used; in many cities at the turn of the twentieth century, animals were loaded into huge cages and lifted by cranes into a river or bay. Electrocution was popular in the 1920s, with animals placed in cages with zinc floors wearing conductive collars. With the advent of the gasoline engine, the use of carbon monoxide "gas chambers" became commonplace. This method was later refined by replacing the raw, hot exhaust of the engine with commercially prepared gas from tanks. The decompression chamber was considered an improvement over previous methods when it was initially developed; however, persistent mechanical problems and questions about its humaneness quickly caused it to be prohibited in most areas, and completely eliminated today.

Since 1963, the American Veterinary Medical Association (AVMA) has reviewed euthanasia methods by regularly gathering a panel of experts to evaluate the latest studies and information about the various methods available. The *AVMA's Guidelines for the Euthanasia of Animals*, updated most recently in 2020 (avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf), contains a list of recommendations specifically intended for veterinarians (and by extension, trained euthanasia technicians) to follow in providing euthanasia for a variety of species. This report is the most extensive study of euthanasia methods currently available. In evaluating various euthanasia methods, the AVMA panel evaluates each method based on twelve criteria:

1. Ability to induce loss of consciousness and death without causing the animal pain, distress, anxiety, or apprehension;
2. Time required to induce loss of consciousness;
3. Reliability of the euthanasia process;
4. Safety of personnel;
5. Irreversibility;
6. Compatibility with requirement and purpose;
7. Emotional effect on observers or operators;
8. Compatibility with subsequent evaluation, examination, or use of tissue (this relates primarily to euthanizing food animals and animals used in scientific study — the presence of sodium pentobarbital is found in most tissues shortly after injection and can have detrimental effects);
9. Drug availability and human abuse potential;
10. Compatibility with species, age, and health status;
11. Ability to maintain equipment in proper working order;
12. Safety for predators/scavengers should the body be consumed (this takes into consideration both consumption of food animals and the risk to scavenging animals ingesting a carcass in a landfill area).

Since 1986, the AVMA has consistently concluded that "the intravenous injection of barbituric acid derivatives [i.e., sodium pentobarbital] is the preferred method for euthanasia of dogs, cats, other small animals, and horses." When administered properly, sodium pentobarbital is capable of causing death quickly and painlessly and may be used consistently and reliably with many species.

Nevertheless, even sodium pentobarbital does not meet all 12 criteria. For example, it is a federally controlled substance with high abuse potential, which puts it at odds with criteria nine. Moreover, it has several characteristics that may be considered both advantages and disadvantages. Its use requires close contact with each animal, which can provide beneficial comfort and the reduction of stress to the animal (criteria six), but as with all euthanasia methods this takes a toll on the humans involved (although technicians performing euthanasia by injection are generally heartened by their ability to gently hold animals being euthanized, reporting less stress than those who used more removed methods like the gas chamber). Effective use of sodium pentobarbital also typically requires the participation of at least two trained staff members, to provide a higher degree of safety and support for the personnel involved (criteria four); some view this as a disadvantage because dedicating multiple staff members to the procedure requires more time than methods that can be performed by a single individual, but a properly trained team can actually be more efficient than a single individual.

While sodium pentobarbital may not be the perfect means of euthanasia, it comes closest of any of the currently available methods. All of its disadvantages weigh against the people who administer it, and all of its advantages weigh in favor of the animals. Therefore, its deficiencies, while certainly legitimate, do not outweigh its advantages, and should not be used as an argument in favor of lesser alternatives.

We hope that in the future, an even more sophisticated technique will be developed—one that meets all 12 criteria listed by the AVMA. In the meantime, it is our responsibility to use the best method now available, and to use it with skill, compassion, and consistency.

CHAPTER 2

Introduction to Euthanasia by Injection (EBI)

No matter how frequently or infrequently euthanasia is performed in a facility, no other component of shelter work is as consequential or will be as carefully scrutinized by the public. It is imperative that every sheltering facility have a written euthanasia policy that identifies when euthanasia will be performed, how it will be performed, and by whom. It should also provide guidance as to available drugs and dosages, safety information, restraint policies, carcass disposal policies and instructions on completing all necessary paperwork and record-keeping to ensure compliance with state and federal regulations. All staff involved in euthanasia must be trained thoroughly on this policy.

Selection Criteria

A facility's written euthanasia protocol should provide clear guidance as to which animals will be considered candidates for euthanasia, and what the review and approval process for determinations will be. While these guidelines should be clear and consistent, they must still be flexible; rules that mandate that every animal be euthanized after a specific period of time, for example, are arbitrary and do not serve the best interest of the animals in the shelter's care or foster respect from the public.

A shelter's euthanasia protocol should specify that euthanasia determinations are made by a team with representation from various departments of the shelter.

These decisions should be in accordance with a written matrix that addresses behavior and medical concerns. Animal assessments should follow the definitions outlined in the *Association of Shelter Veterinarians (ASV) Guidelines for Standards of Care in Animal Shelters* (healthy, treatable/manageable, treatable/rehabilitatable or untreatable/unmanageable). The animal's status is critical for pathway planning for euthanasia. To determine whether euthanasia is necessary, shelters should consider such variables as age, health, temperament, physical condition and behavior, and available space, and should attempt to objectively consider other questions such as:

- What are the realistic prospects for providing this animal with a good quality of life?
- Is the animal in pain or distress, and is there realistic hope of (and financial resources for) alleviating this pain to allow for a quality life?
- Does keeping this animal present health or safety risks to other animals or people?
- Given the fiscal and practical limitations faced by this organization, does keeping this animal reduce the organization's ability to humanely care for other animals in need?
- Are there realistic options for rehabilitation/management of the animal's behavioral issues?
- Is temporary placement in foster care possible?
- Is there alternative placement possible with another well resourced animal welfare organization?

The answers to these questions will vary greatly depending on the community (and may even vary from facility to facility within that community) based on financial and staffing resources, demand for space within the facility, and other considerations.

> Ideally organizations employ committees to make euthanasia decisions. Although not preferred, in some cases decisions are made by an individual. To avoid any confusion, the chain of command for decision-making should be specified in the policy and strictly adhered to. Although it may be tempting, a policy requiring 100 percent agreement from all staff or volunteers, or both, before a euthanasia decision is reached is difficult to implement. Not only does it often result in a stalemate where no actual decision is reached and the animal sits in limbo, it forces everyone to carry the burden of euthanasia-related stress, even those who are not psychologically trained to handle it. A better practice is to empower individuals to express their thoughts and concerns, but charge a few key staff members, those who can be relied on to make objective decisions in accordance with policy, to make the ultimate decision.

Generally, animals must not be euthanized prior to the expiration of their legally mandated minimum hold time. If an exception must be made because the animal will endure unnecessary suffering by being held, the reason for the exception should be specified in writing and whenever possible confirmation of the necessity for the decision should be obtained by a licensed veterinarian.

IMPORTANT NOTE: Some states mandate veterinary approval before any animal is euthanized within its hold period; check with an attorney to ensure that your process for euthanasia prior to the expiration of the legal minimum hold time is lawful in your jurisdiction.

Occasionally, stories surface about a shelter euthanizing the "wrong" animal—either mistaking one animal for another (usually because they are in the wrong cage, have the wrong paperwork, or because they are similar in appearance to another), or mistakenly selecting an animal that has a potential adopter, or worse, an animal that has an owner. To minimize the chances of such mistakes, the protocol should specify steps to verify that the right animal has been approved and selected before any drugs are administered. At a minimum, this should involve checking and cross-checking the animal's ID number and description by no less than two separate individuals, rescanning the animal for a microchip, and verifying one final time that there are no administrative or possible owner holds associated with the animal. If there are any doubts, the process should be halted until confirmation that the proper animal has been selected is obtained.

Policy Elements

The agency's written euthanasia policy should ensure that animals are being euthanized in accordance with the highest standards of humane practice, and in conformance with all applicable state and local laws. Technicians should be empowered to select the most appropriate approved method of euthanasia for each individual animal. The policy should also remind technicians about the importance of verification of death and indicate proper methods for disposal of remains.

> Partnerships with rescue groups and other facilities can afford lifesaving opportunities for animals that might otherwise be euthanized. However, facilities must make rescue decisions responsibly, ensuring that transfer partners have the resources to meet the animal's behavioral and medical needs.

Necessary policy elements include:

- Selection criteria for euthanasia;
- Procedure for recommendation and approval of euthanasia decisions;
- Verification procedures designed to ensure that the proper animal is euthanized, including assurances that:
  - the proper signatures/approvals have been obtained;
  - the animal's minimum hold date, if applicable, has expired or a documented exception to the minimum hold time has been obtained;
  - the description and identification numbers of the animal ready for euthanasia match the approval paperwork exactly;
  - the animal has no adoption, possible owner or other hold in place;
  - the animal has no evidence of ownership (no tattoo, microchip, or lost report) or that all attempts have been made to identify an owner and the hold period has passed;
- Statement regarding who is permitted to perform euthanasia (should reflect applicable training requirements for the jurisdiction);
- Statement regarding who will be permitted to be present in the euthanasia room (e.g., will member of the public be permitted to witness euthanasia of their pets?);
- Procedures for performing euthanasia;
- Procedures for verification of death;
- Procedures for proper disposal of remains;
- Procedures for drug handling and storage;
- Emergency procedures, staff safety protocols and applicable personal protective equipment required;
- Procedures for recordkeeping/ administrative compliance (e.g., every facility managing controlled substances must keep logs detailing the date of euthanasia, weight and perceived breed of animal, volume of drugs used, and technician's initials, and this log must be updated as each animal is euthanized).

Determining whether an animal should be euthanized for behavioral reasons is a complex process. The collection of behavioral information should begin as soon as an animal arrives in the shelter and may include a history from the animal's owner or a shorter history from a good samaritan or animal control officer if the pet was found. It is not recommended that a formal behavior assessment be conducted on animals or that one be used solely to determine whether a pet should be euthanized. Instead, a collection of objective behavior information on the pet while under the care of the shelter or rescue—such as from staff, volunteers, foster parents, veterinary staff and others, can help guide decision-making.

Volunteers and Euthanasia

Euthanasia decisions can be a source of tension between a shelter and its volunteers. Clear communication about expectations and policies is crucial. Volunteers should be made aware of your organization's euthanasia policy from the outset, and they should be provided a clear channel for communicating questions about euthanasia decisions (rather than putting technicians on the spot). By the same token, while volunteers should not necessarily be empowered to influence euthanasia decisions, respect for their feelings or experiences with and knowledge of the animals they are working with should be considered. By creating a culture that is open, honest and respectful, an organization and its volunteers can form a successful partnership without strife over euthanasia decisions.

While shelters are well-served to be transparent and open about euthanasia decisions, it is important to be aware of the effects those decisions have on staff members. Comments and questions from employees and volunteers alike (such as "You're not going to euthanize that one, are you?" or "What happened to Fluffy?") are certainly understandable, but they can be hurtful to technicians and handlers already carrying a tremendous burden. While employees and volunteers should be given an outlet for their questions and comments (for example in many shelters the shelter manager or volunteer coordinator is responsible for addressing such questions and concerns), they should be encouraged to respect the feelings of the staff members involved and refrain from commenting about euthanasia decisions.

CHAPTER 3

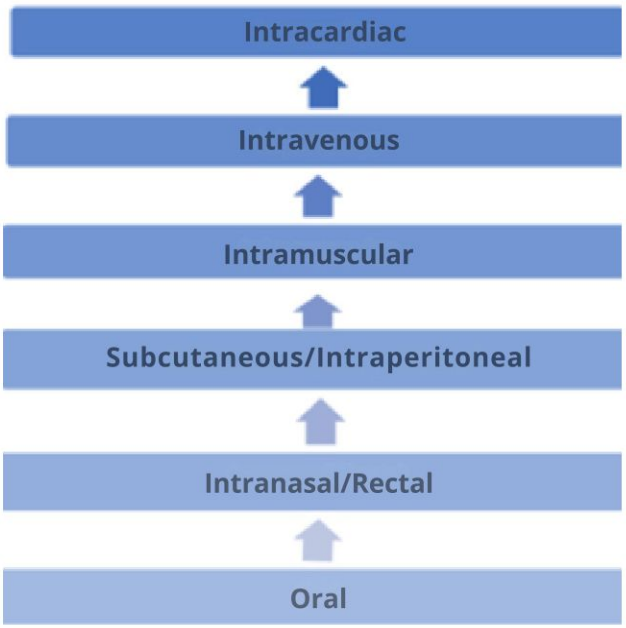
Introduction to Giving Injections

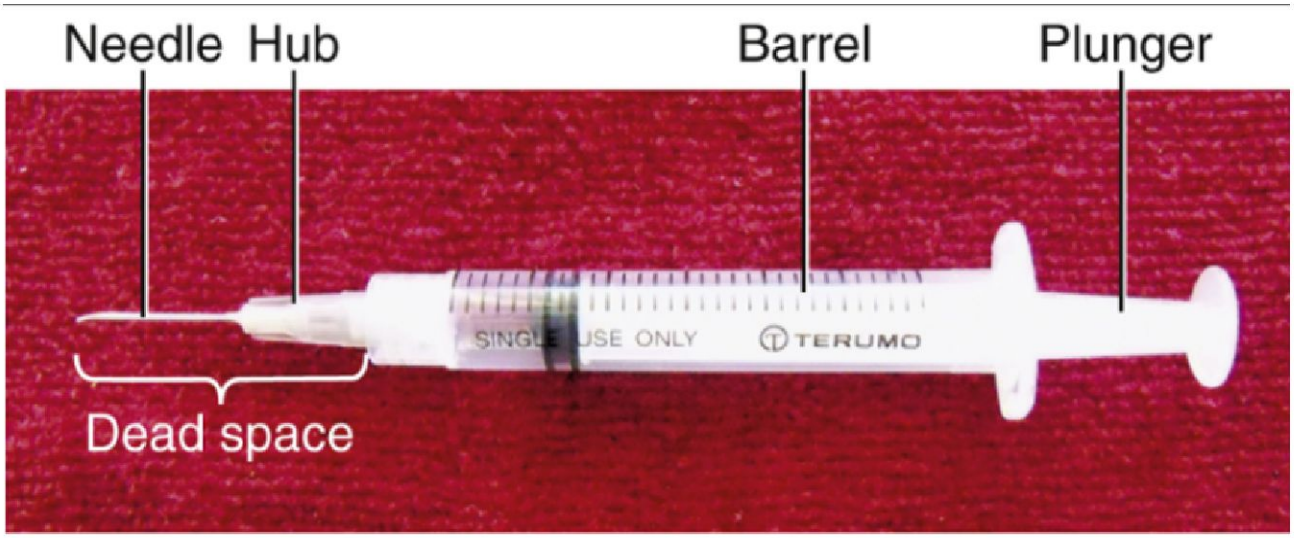
Pre-euthanasia and euthanasia drugs are given by multiple routes including by mouth, on the mucous membranes (OTM) and by injection. Injection routes include, subcutaneous (SC), intramuscular (IM), intraperitoneal (IP), intravenous (IV) and intracardiac (IC) routes. Remember that birds, reptiles, fish and amphibians do not have a diaphragm, so they have a coelom, not a peritoneal space. This means an injection in this region is called an intracoelomic (ICo) injection. There are other dose routes that may be used occasionally for animals. They include into the rectum (per rectum PR) and intranasal injections (IN, squirted in the nose).

The administration sites that are typically used for pre-euthanasia and euthanasia drugs are listed below:

- PO by mouth
- OTM on the mucosa (apply to gums)
- SC under the skin (tent the skin)
- IM into the muscle
- IP or ICo into the abdomen or body cavity
- IV into the vein (draw back and get a flash of blood)
- IC into a chamber of the heart (draw back and get a large amount of blood)

How quickly pre-euthanasia and euthanasia drugs work depends on how the drug was delivered. In general drugs that are given directly into the circulatory system work very quickly (under a minute) while drugs given orally, into the abdominal space or on the mucous membranes take longer to work. See the chart below. Drugs given into the heart work very rapidly, while drugs given by mouth have a much slower onset.





Syringes and Needles

The most frequent delivery route for pre-euthanasia and euthanasia drugs is by injection. This means that the euthanasia technician will be using syringes with needles attached. It is important to know the parts of a syringe. They are the needle, needle hub and plunger.

Syringes

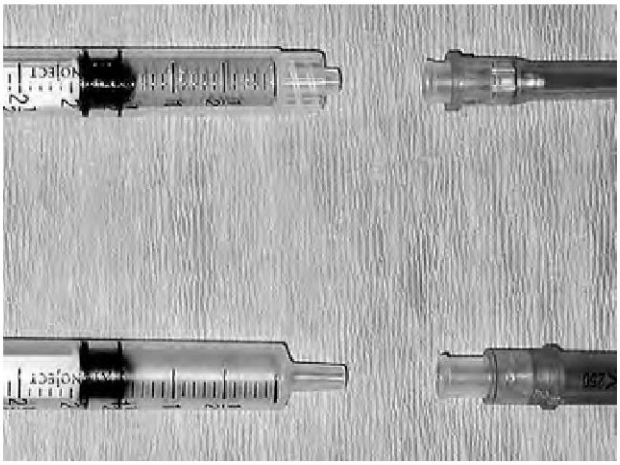
All syringes commonly used for euthanasia are plastic and disposable. Use new syringes during every new euthanasia procedure. Separate syringes must always be used for each drug administered. Replace the needle used to draw up drugs with a new needle before injecting an animal.

Syringes of 1, 3, 6, and 12 ml are most commonly used with dogs and cats, and shelters should keep all four sizes in stock. Larger sizes are available for livestock and other large animals, and smaller sizes can prove helpful for rodents and small birds. For the most part, the larger the syringe the more expensive it is and the more unwieldy it is to use; therefore, technicians should always select the smallest syringe available to handle the necessary dose of drug.

Syringes are available either with or without a locking "hub" for the needle. The hub is the protrusion at the end of the syringe over which the needle is fastened. A standard syringe has a smooth, or "slip", hub, in which the needle is simply pushed over the hub and held in place by friction. While this type of syringe is easiest to use, if care is not taken, the needle may pop off as the plunger pushes the drug through the small needle opening, causing the drug to spray into the face and eyes of the technician. This can be avoided by ensuring that the hub is dry before attaching the needle.

A syringe with a hub that allows the needle to be mechanically screwed onto the syringe (known as a "locking hub" or "leur lock" hub) is preferred because it helps prevent the needle from accidentally coming off the syringe, an important safety feature. The locking hub also fixes the placement of the needle on the syringe at a stationary position.

Most smaller syringes have hubs located in the center of the syringe (these are known as centric syringes). Larger syringes (more than 6 ml) are available with off-center (eccentric) hubs that are located at the edge of the syringe, so that the needle is on approximately the same plane as the animal's leg. This can be a great advantage because it reduces the angle between the syringe and the vein, making it easier to administer a proper injection. Unfortunately, off-center hub syringes are not currently available in the locking hub style, so care must be taken when using them to ensure that the needle does not pop off.



Needles and syringes

Needles

As noted earlier in this manual, needles are available in several sizes, called gauges, according to the bore diameter (the size) of the needle. The smaller the diameter of the needle, the larger the gauge size – for example, a 25-gauge needle is smaller than a 22-gauge needle, which is smaller than an 18-gauge needle. Most shelters use 18–25-gauge needles for euthanizing companion animals.

Choosing a smaller needle generally produces less pain for the animal on injection. However, smaller needles are more fragile and more likely to bend with animal movement; moreover, the smaller bore means that the drug moves more slowly through the needle, making it impossible to achieve a bolus effect if a large amount of Sodium Pentobarbital needs to be administered. Also, a small bore needle on a larger barrel syringe will create more pressure, potentially causing the needle to pop off. Therefore, selecting the right needle for the right animal is a critical part of the euthanasia process. Typically, cats, puppies and small animals use smaller needles for IV injections, 22-gauge and smaller. Dogs typically do well with 20-gauge needles, depending on the size of the animal (although a very small Chihuahua may do well with a 22-gauge needle). Selecting the proper needle comes with experience and is part of a good euthanasia technician's toolkit for making euthanasia as humane as possible for each individual animal.

In addition to different gauges, needles also come in different lengths. A euthanasia technician will select a short needle for euthanizing small animals such as guinea pigs or kittens but will select a longer needle when euthanizing larger animals like livestock. Even if livestock are not common in your facility, it is important to have longer needles on hand to facilitate intracardiac injections on deep barreled or obese animals, in order to verify death. The common needle lengths for dog and cat euthanasia are ¾ inch to 1 inch, and 1½ inch needles are useful for IC injection.

SPECIAL NOTE: Always use a new needle when injecting an animal.

Recommended Needle Size/Application

14-gauge, 1 inch/
Sodium Pentobarbital draw needle

18-gauge, 1 ½ inch/
IC, large dog

20-gauge, 1 inch/
IV, dogs 60 pounds and larger,
IC, small dog

22-gauge, 1 inch/
IV, dog less than 60 pounds

22-gauge, ¾ inch/
IP, adult cat

25-gauge, ⅝ inch/
IV, cats; IP, kittens

Recommended Syringes Size/Hub Style

1 cc/luer slip or lock

3 cc/luer slip or lock

6 cc/luer slip or lock

12 cc/eccentric luer slip only

Sharps Containers

All shelters should use approved medical waste containers (called "sharps containers") for disposal of used needles. Needles must never be discarded with general waste disposal, as they are a potential source of injury and/or infection. There is also a risk that this dirty needle will fall into the hands of an IV drug user if disposed of improperly.

Tourniquets/Hemostats

While it is recommended that there always be two people involved in the euthanasia of an animal, one handler and one euthanasia technician, there may be times when the handler cannot successfully "hold off" the vein for the technician. In those cases, a Nye tourniquet (a commercially made unit with a metal restricting device) or a combination of rubber tubing and hemostat can be clamped just above the animal's elbow, constricting the blood flow in the vein and causing it to enlarge. Once the vein has been successfully entered, the technician must be careful to release the pressure before injecting sodium pentobarbital, as it will block the drug from smoothly circulating to the heart. Tourniquets and hemostats can be purchased from veterinary and medical supply companies; alternatively, shelters can contact local hospitals and veterinary offices for possible donations of used equipment.



Using a tourniquet to hold off the lateral saphenous vein for injection

It is important to gather all supplies needed as part of your preparation to perform euthanasia. Your supply list should include syringes, needles, tourniquets, clippers, alcohol etc. Being organized makes the process less stressful and easier to complete for the euthanasia technician. Because you are prepared, it makes the process less stressful for the animal.

IMPORTANT NOTE: How to deliver drugs by intramuscular route is discussed in Chapter 6: Pre-Euthanasia Drugs. How to deliver drugs by the intraperitoneal/intracoelomic, intravenous and intracardiac routes is discussed in Chapter 8: Injection Routes for Euthanasia.

CHAPTER 4

Animal Handling and Restraint

Restraint during the euthanasia process should follow the principles of low stress handling. The technician should make a plan that is based on review of the animal's behavioral and medical records and observation of the animal. In many instances the animal will receive injectable pre-euthanasia drugs that are given 5-10 minutes prior to the injection of sodium pentobarbital. In some cases, oral pre-euthanasia drugs may be given prior to injectable drugs. When oral drugs are administered, they are given the night before and at least 2 hours before the injection of Sodium Pentobarbital. They are given to reduce fear, anxiety and stress.

The Certified Euthanasia Technician (CET) must allow the animal time to acclimate to the euthanasia room and to become comfortable in that space. High value treats should be available to help reduce fear, anxiety, and stress (FAS). The technician should also use the least amount of restraint necessary for all injections. A combination of low stress handling, injectable pre-euthanasia drugs and, potentially, oral pre-euthanasia drugs are critical components of good animal welfare during the euthanasia process.

In all cases the animal must be humanely restrained in some fashion for the drugs to be administered. The handler therefore assumes a crucial responsibility, ensuring that the animal's last interaction with humans is filled with as much kindness, compassion and gentleness as possible while preserving the safety of all humans in the room.

A successful handler must be able to accurately read the body language and behavior of the animal, understand how voices and movements both inside and outside the room may affect the animal, and be familiar and comfortable with all of the tools available to do the job most humanely and effectively.

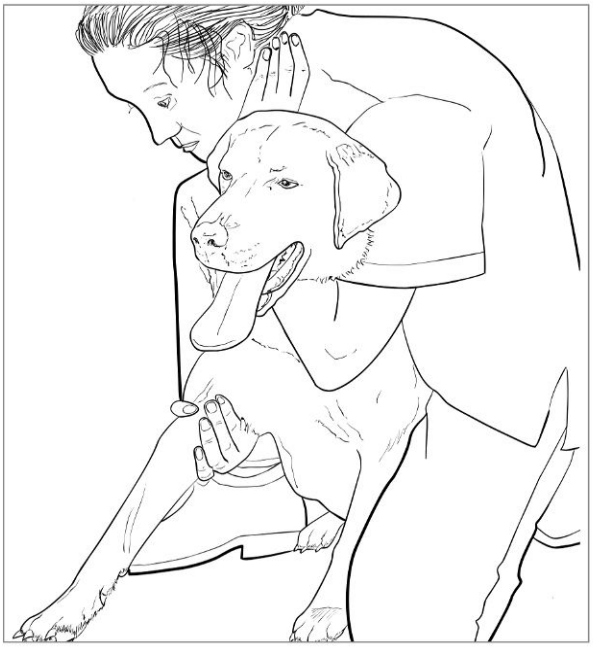
Fractious, fearful or highly aroused animals may reject human contact and become more stressed when near people. Proper euthanasia for these animals requires the least amount of human interaction and handling possible and is typically best achieved by administration of a pre-euthanasia drug that allows the animal to lose consciousness in a dark, quiet, safe enclosure before a fatal dose of sodium pentobarbital is administered. There is no magic formula for determining which technique is best used for a particular animal; the decision must be based on the individual animal involved, their reaction to the situation presented, and the resources available at the time. The ability to evaluate each of these elements is the handler's greatest asset and is crucial to providing the animal a "good death" with minimal stress and anxiety.

NOTE: All of the following information relates to the restraint of dogs and cats. Because of the wide range of variables, it is not possible to address all the techniques that should be applied with other species, so handlers must consult experts to ensure that the restraint techniques utilized are as humane as possible.

Typical Restraint Techniques - Dogs

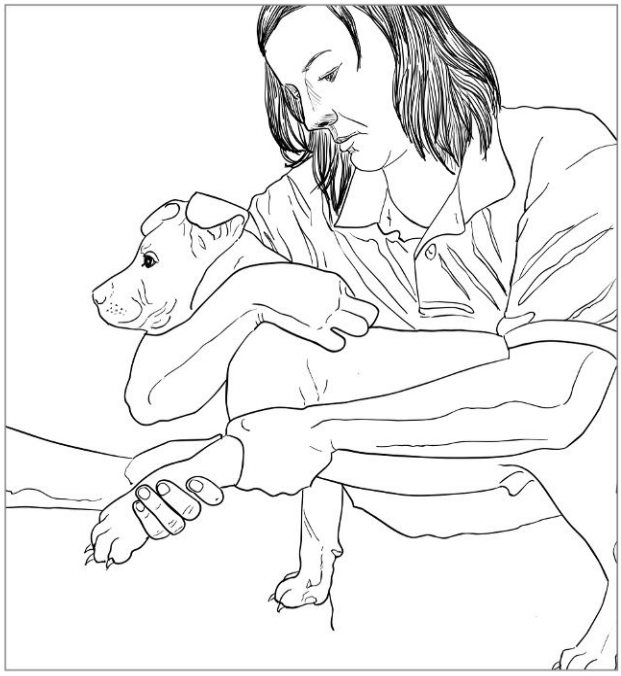
Restraint for Direct Injection

In some states shelters may not have legal access to pre-euthanasia drugs, making it necessary to perform euthanasia without the benefit of these drugs. To administer an IV injection to a dog who is conscious, it is common practice for the handler to stand alongside the dog, facing the same side of the dog, and use the arm closest to the dog's head to cradle their neck in the crook of the elbow (they can use that hand to scratch or rub the dog's ear or neck as an extra measure of reassurance). The handler's other arm then reaches over the back of the dog and grasps the far front leg just behind the elbow, extending it for the CET to inject into. Most well-socialized dogs will not object to this type of gentle restraint, but if they do resist, the CET must stop and alter the restraint plan. Consider using an injection of a pre-euthanasia drug that causes a loss of consciousness if the drug is available. Smaller dogs can be held in this manner on top of a steady table, while larger dogs should be allowed to remain on the floor. Held in this manner, dogs administered an IV injection quickly fall unconscious while still in the arms of the handler.



Proper hold of a dog for direct injection

When handling puppies, the handler may simply draw the puppy up close to their body, using one arm to support the weight of the body (the puppy's tail facing the handler's elbow, the handler's fingers between the front paws supporting the neck and helping to extend one foreleg) and the other to gently control the puppy's head. Alternatively, the IP injection route may be used for small puppies under six-weeks of age. Whichever method is chosen, ensuring that the puppy feels secure is paramount.



Proper hold of a puppy for euthanasia

Restraint for Administration of Pre-Euthanasia Drugs

Make a plan for delivery of pre-euthanasia drug to reduce FAS. If oral pre-euthanasia drugs are available, ask the medical staff if they may be dispensed the night before and the morning of euthanasia. Allow the dog to acclimate to the euthanasia room and offer high value treats. Use the least amount of restraint necessary to inject the pre-euthanasia drug IM into the thigh or the back muscles. Consider distractions like walking the dog while injecting the pre-euthanasia drug through a butterfly catheter. Resort to higher level restraint like a control pole or a press gate when human safety is a concern and the dog's FAS is escalating. At that point it may be in the dog's best interest to apply restraint and inject the pre-euthanasia drug.

Once the injection has been administered, the dog should be left alone in a quiet, secure environment until they have lost consciousness, whereupon injection of sodium pentobarbital can be performed; if the handler chooses to remain with the dog while it loses consciousness, the handler should be prepared to gently restrain the dog through all of the stages of anesthesia so the dog does not injure themselves.

Typical Restraint Techniques - Cats

Restraint for Direct Injection

Because intraperitoneal (IP) injection, when performed properly, causes no pain, well socialized cats can be injected directly with sodium pentobarbital with very minimal restraint. This may be a preferred route for an animal who is struggling during an IV injection. The handler simply places one hand between the cat's two front legs, grasping them gently together, and lifts the front of the cat slightly off the table surface. When restrained in this manner, the forelimbs of the cat need to be lifted only enough to allow the CET to determine the proper location for injection, and most cats do not object. Because IP injection takes time for full effect, after the injection is administered the cat should be placed in a quiet, dark cage or carrier until he or she loses consciousness.

IMPORTANT NOTES: If the cat struggles and resists gentle handling, IP injection should not proceed; instead, a pre-euthanasia drug should be administered. Also, cats should not be stretched for IP injection. If a cat is resisting restraint while trying to perform an IP injection, the CET must stop and opt for a pre-euthanasia injection. Once the cat is unconscious, the euthanasia technician can proceed with euthanasia with an accepted euthanasia route (IP, IV or IC).



Using both hands to properly support a cat

Restraint for Administration of Pre-Euthanasia Drugs

If a cat cannot be safely handled for direct injection, a pre-euthanasia drug should be administered. If the cat will accept minimal handling, simply open the cage door and gently hold the cat securely in place (either by gently restraining it, with or without a towel draped over its head to encourage the cat to calm down and to provide an extra measure of security. Another option is to use a clear plastic shield or other device designed to gently hold the cat in place) with the head turned away, then inject the cat with the appropriate pre-euthanasia drug in the large leg muscle. Once the cat has been injected, close the cage door and leave the cat alone or place the cat in another quiet, dark, secure place to limit stimulation while the drug takes effect. When the cat is unconscious, they can be brought to the euthanasia table and given an IV or IC injection of sodium pentobarbital.

IMPORTANT NOTE: If pre-euthanasia drugs are administered while the cat is in a cage, be sure to remove water, so that the cat does not drown (it is advisable to remove everything from the cage except the towel or bedding).

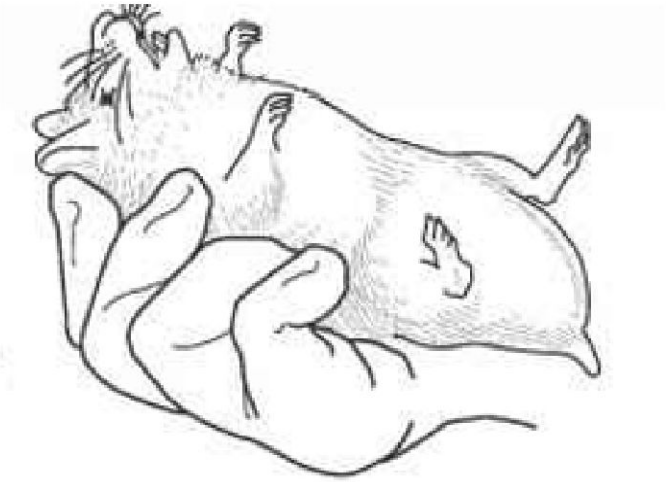
For fractious cats, avoiding any direct handling is the best approach. Consider using a syringe pole to gently administer a pre-euthanasia drug in the large muscle mass of the leg. Cats that are overtly aggressive when the syringe pole is introduced into the cage will likely need to be removed to humanely administer the drug (remember, it is unacceptable to administer pre-euthanasia drugs in any location besides a large muscle mass, so a cat who will not hold still for careful placement of the needle should not be injected). The cat should be secured in a net or EZ nabber for injection, then returned to a secure, quiet, dark area to allow the drug sufficient time to take effect. Alternatively, the handler can either transfer the cat to a squeeze cage, or restrain them with a net, fork or Plexiglass shield for an IM injection of pre-euthanasia drugs. Again, once the injection has been administered the cat should be placed in a dark enclosure to lose consciousness.

When handling rabbits, hamsters, and other small mammals, the same general principles apply—the least amount of restraint is always best. Many mammals aren't comfortable being carried, so keeping them in their familiar enclosures to the greatest extent possible is best. And always be sure to support small mammal bodies fully—never pick up or carry an animal by the ears or tail, and be certain that the entire length of their body is supported.

General Restraint Techniques

No matter what method is used, it is important that everyone involved in the euthanasia process speak in calm, quiet, reassuring tones, and avoid rapid, jerky, or threatening movements. A calm atmosphere may reduce a nervous animal's FAS sufficiently to avoid having to use additional restraint tools, and can keep a docile animal tractable.

Even if an animal appears to be receptive to gentle restraint, it is crucial that a backup plan be available in case something goes wrong. Nets, towels, control poles, and other tools should be at the ready in case an animal begins to resist restraint, and pre-euthanasia drugs should be available to administer quickly when direct injection is no longer a viable option.



Hamster restraint for an IP injection.

Restraint Tools

Although there is no substitute for the knowledge and experience of the handler, humane animal handling tools are some of the most important pieces of equipment a shelter can have. Standard equipment that should be accessible at all times include: leashes, towels, gloves, control poles, bags, nets, ropes, muzzles, barriers, and various types of confinement units. When using restraint tools, the principle that the least restraint is best always applies. A control pole or press gate should not be a first option when the use of a leash or a towel will do. It is the handler's responsibility to read the animal appropriately and decide which, if any, restraint tool(s) should be applied to humanely secure the animal and preserve human safety.

IMPORTANT NOTE: If restraint tools are necessary, pre-euthanasia drugs should be used instead of attempting direct injection of sodium pentobarbital.

Time

The most crucial, yet most frequently overlooked, tool for humane animal handling is time. Animals who appear nervous or fractious can often be humanely handled with just a leash or a towel if they are approached slowly and given sufficient time to acclimate to the handler's presence. Unfortunately, in shelter settings the overwhelming amount of work to be done and the frequent shortage of staff available to do it sometimes forces staff to rush. However, it is vital that handlers appreciate that taking their time with an animal can avoid a prolonged battle on a control pole or other device, can keep all of the humans involved safer, and will actually save time in the long run. It is equally critical that those not involved in the euthanasia process be respectful of this important point, and ensure that staff are not interrupted or rushed.

Leash

For dogs, a leash is one of the most basic, but often overlooked pieces of restraint equipment available to an animal handler. Provided the dog has been properly socialized to it, a leash can be an effective tool for positioning the animal's head and body, and it ensures that the animal will not bolt away if it becomes startled or frightened. Handlers must always take care to ensure that the leash does not choke the dog, as that could cause panic unrelated to the injection process. A flat cloth or nylon leash can also serve double duty as a temporary muzzle when gently wrapped around the dog's snout, if no other option is available. A leash wrapped around the dog's snout will not provide as much security as an actual muzzle, and should not be relied on if there is reason to believe the dog may become fractious.

IMPORTANT NOTE: Leash muzzles can injure the animal if not applied properly (if the leash is twisted or pinches the lips), which can actually cause the animal to become more difficult to handle. When possible, use a commercially made muzzle or fashion one out of soft gauze rather than a leash.

Towel

For most animals, a towel gently draped over the eyes has a calming effect, which can work to a handler's advantage in a euthanasia setting. Handlers must not simply assume that a towel will prevent an animal from biting or scratching. Care must be taken to properly secure every animal whether or not a towel is used to calm them.

A towel is an extremely useful tool for handling mildly uncooperative cats. Drop a thick towel over the cat in a cage so that the head and body are covered; after allowing him or her to calm down under the towel. The cat and towel together can be safely scooped up and carried from the cage to the euthanasia table.

For slightly less cooperative cats, a towel wrapped snugly once or twice around the head, legs and body will protect the handler from being scratched. This "kitty burrito" acts much like a cat bag to minimize scratching and biting. The confinement provided by the towel often calms the cat (this technique can also be used on small dogs).

For dogs, a towel can even be used as a makeshift Elizabethan collar, preventing the dog from turning its head to bite, particularly for small breed dogs.

Gloves

Gloves can often provide protection from bites and scratches, and are an immensely important tool, particularly when handling a fractious cat or small animal. But gloves can provide either thickness and bite protection or dexterity and sensitivity—not both—making any glove less than desirable for extensive use in a euthanasia setting. True animal handling gloves (as opposed to more traditional general work gloves) can offer protection from both crushing and penetrating bites. While general work gloves (typically leather gloves made for construction or farm work) can be better than nothing, they do not compare with the rugged design of gloves that are specifically sold for animal handling work. Some of the best gloves available have two layers, using both dense leather and Kevlar, and may reach all the way to the shoulder. However, the more protection the glove affords the more restrictive it is. For that reason, while gloves are a useful tool, many handlers elect not to use gloves unless necessary. Gloves should therefore never be considered a substitute for proper handling technique.

Muzzle

Muzzles are an essential tool for minimizing bite risk, and should be used whenever there is any doubt as to whether a dog might become fractious. Lightweight, easy-to-clean nylon muzzles, leather muzzles and even metal basket muzzles are available in a wide range of sizes and styles. No matter what style is used, take care to ensure that the muzzle is securely applied. Even after application, it is critical to use safe handling techniques. The muzzle may somehow slip or be removed by the animal. Once applied, the muzzle should not be removed until the animal has completely lost consciousness, because even after pre-euthanasia drugs have been administered the dog may experience an excitement phase with reduced bite inhibition. It is imperative to closely monitor a muzzled dog to ensure that they do not vomit with the muzzle on, which could cause the dog to choke. If vomiting occurs, quickly but cautiously remove the muzzle and allow the dog to expel the vomit. Dogs who are panting heavily from stress or exertion should be allowed to calm down before a muzzle is placed.



Application of a muzzle can increase worker safety

Press Gate

For dogs who can be safely walked on a leash but who may become fractious when IM injection is attempted, a press gate (also commonly referred to as a restraint gate or a squeeze gate) can be a useful alternative to putting the dog on a catch pole. The press gate typically looks like a small section of chain link fencing that has been secured to a wall on one side, leaving the other side free to swing back and forth. With the gate swung open, the dog is walked towards the affixed end of the gate; the loose end of the gate is then gently swung back towards the wall. This secures the dog's body between the gate and the wall, allowing the CET to perform an IM injection in the dog's back leg. In most cases, when the press gate is used by experienced personnel the process runs smoothly; however, there are occasions where the dog becomes frightened or aroused by the confinement of the gate. In such cases, the handler can further secure the dog by running its leash through the front of the gate and holding them near the floor, to maintain an extra measure of control over the front of the dog's body so that they can't back out or try to go up and over the gate. For shelters that have no press gate, the effect can be simulated using the door of a traditional dog kennel.



A press gate is a useful tool for securing a fractious dog for injection of pre-euthanasia drugs

Control Pole

Probably no device has saved more animal shelter personnel from serious injury than the control pole (also commonly referred to as a catch pole or rabies pole). When properly used, the control pole serves as an extension of the handler's hand, allowing them to safely secure and guide a dog who could not be safely approached in closer proximity. However, the control pole can easily be used improperly and can cause serious injury or even death to a dog. Therefore, a control pole should only be used when the dog presents a legitimate risk of serious injury to the handler. If the dog can be safely walked on a leash, or the dog is small enough that it can be secured with a towel, a control pole should not be used.

IMPORTANT NOTE: A control pole should never be used on a cat or small dog.

There are several commercially manufactured types of poles available for purchase, and shelters should keep several of them handy in the dog housing areas and the euthanasia room. Control poles should be checked frequently to ensure that they remain in good working order.

As noted above, a control pole should serve as an extension of the handler's arm, and should simply help to guide the dog's body, not to choke, yank or drag it. The noose (loop) of the pole should be placed as low on the dog's neck as possible to avoid crushing the larynx. Apply just enough pressure on the noose to ensure that the dog cannot slip out of it. Too much pressure may cause the dog to panic, particularly if the dog feels their airway is being cut off. (A good test of this is to slightly release the noose on a dog who is struggling on the pole. If the dog relaxes, it is likely that the noose was so tight the dog was feeling suffocated.

Once the dog is securely on the pole, use it to guide the animal forward. Never drag a dog on a control pole. If the dog will not move on it's own, the handler should position themselves behind the dog to encourage it to step forward; the dog should be permitted to move forward at their own pace, rather than being pushed with the pole. Typically, one pole is sufficient to secure a difficult dog; however, for exceptionally large, fractious dogs, a second pole can be applied by a second handler to ensure that the handler is not overpowered. Again, the goal is not to force a dog to comply through use of one of more poles, but simply to prevent injury and help guide the dog in the general direction required.

To reduce the anxiety of both the animal and the handler, the amount of time a dog spends on the end of a control pole should be limited. The design of a euthanasia area and pre-planning for the handling of aggressive dogs is essential for minimizing both human and animal stress and to provide euthanasia safely. Too often, animal handlers are forced to move an aggressive dog on the end of a control pole across the shelter grounds to the isolated euthanasia area. By the time they arrive, both dog and handler are stressed and exhausted. Instead, if aggressive dogs arrive at the shelter specifically for euthanasia, they should ideally be driven directly to the euthanasia area for a pre-euthanasia anesthetic injection. Alternatively, they can be placed into a wheeled transport cage that is brought directly to the euthanasia room. The leash or control pole, still on the dog, can be pulled taut through the cage door to restrain the neck of the dog while a pre-euthanasia injection is given.

Ideally all euthanasia-related procedures should be performed in a designated euthanasia area, for some fractious dogs who become highly aroused on a pole it may be most humane to administer pre-euthanasia drugs while still in the safety of their kennel. This is often not only less stressful for the dog, it also reduces the chances that the other dogs in the kennel will become stressed witnessing the dog fight the control pole. To administer pre-euthanasia drugs to a dog in a kennel, first secure the area to ensure that members of the public and volunteers will not unwittingly stumble upon the scene and cause a distraction. Next, properly apply a control pole to the dog and either use the gate of the kennel as a makeshift press gate or gently press the dog's head towards a corner of the kennel, allowing the technician easy access to the dog's hind or back leg for IM injection. Because kennels are usually such tight quarters, it will be critical that the handler is experienced enough to ensure that the dog remains secure and that the technician is adept enough to administer the pre-euthanasia drug efficiently and quickly. Once the drug has been administered and the CET has safely left the kennel, the dog should be released from the pole and allowed to lose consciousness. At that point they can be carried to the euthanasia area on a stretcher or a cart for injection of sodium pentobarbital.

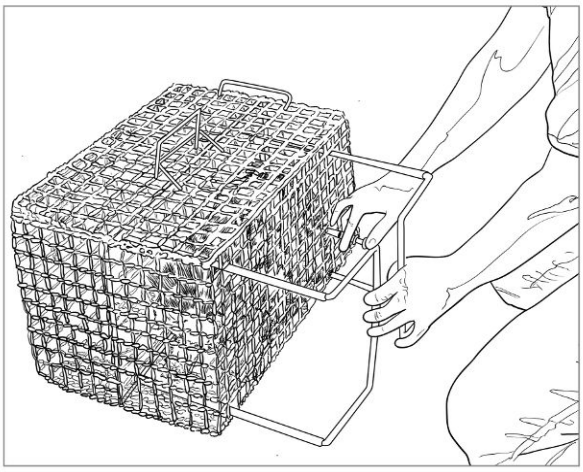
> Even the most docile cats who are accustomed to wearing a collar will resist a control pole or other tightening around their neck. Therefore, control poles should never be used on cats.

Squeeze Cage

One of the most practical devices for safely restraining cats (and even wild animals like raccoons, etc.) is a squeeze cage.

A squeeze cage is simply a regular cage or trap with an extra movable wall inside; this wall can be pushed or pulled toward the animal until they are unable to move, helping to ensure safe and humane injection of a pre-euthanasia drug. Ideally, each shelter should have at least one commercially manufactured squeeze cage for use on fractious cats or wildlife. Alternatively, a makeshift squeeze cage can be made by using a commercial or homemade "fork" inserted through a wire carrier or trap. The fork fits through the top or side holes of the container and creates a false "wall" that restricts the animal to the end of the carrier. A pair of forks can be used to "walk" the animal into a pressed position within the cage. The animal can then easily be given an injection, the fork can be removed, and the carrier can be covered to allow the animal to go under the effect of the drug administered.

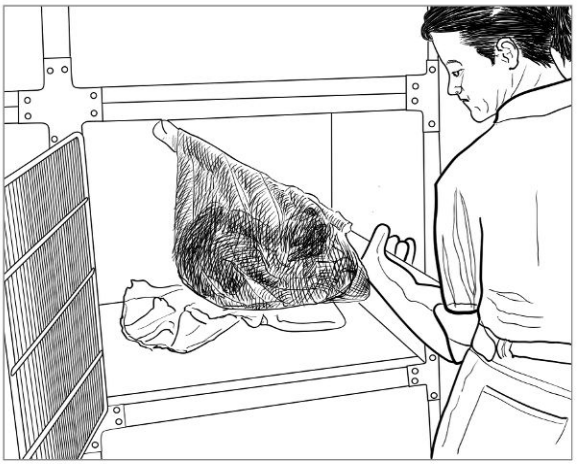
Simple Plexiglas hand-held barriers can also provide an effective variation on the squeeze cage concept. The barrier is inserted into a regular cage and is used to guide an animal into a corner. The animal can then be injected through holes in the barrier. When using a Plexiglas barrier it is critical that it be properly sized so that the cat cannot escape over or around it, causing more stress and possible injury for both the cat and the technician.



A squeeze cage immobilizes a cat for injection of pre-euthanasia drugs

Feral Cat Box

Another alternative for humane IM injection of fractious cats is the use of a commercially manufactured or homemade feral cat box. This is a small box with small holes on the sides that can be used for transporting a cat and for IM injection of pre-euthanasia drugs. A feral cat box is ideal for use because it can be placed inside the cage of the cat, allowing them a safe, stress-free place to hide while in the shelter. When the cat is to be euthanized, simply securely shut the openings of the box and carry it to the euthanasia room.



A net is a useful tool for securing a fractious cat for injection of pre-euthanasia drugs

Cat Bags/Nets/EZ Nabber

Cat bags, EZ Nabbers and nets can be very effective for handling fractious cats. Handlers must be careful to not just catch the cat in the net, but also to roll the net sufficiently to ensure that the cat is rendered completely immobile, allowing for safe and accurate IM injection of pre-euthanasia drugs. Once injected, the cat should be returned to a cage or carrier while the drug takes effect. While fishing nets can be used to secure cats, they are typically not intended to withstand sharp cat claws and they may contain openings large enough for cats to strike out with their legs. Nets made specifically for containment of cats should be used in the shelter setting.

Cat Graspers/Tongs

Cat graspers/tongs are a device designed to grasp and hold a cat securely (the tongs will not tighten enough to injure the animal). They are very useful for securing and removing cats from tight spaces where a net cannot be used. They should not; however, be used for restraining a cat for euthanasia.

CHAPTER 5

The Euthanasia Room

The Euthanasia Room

The ideal euthanasia area is a clean, well-lit, well-ventilated, and readily accessible room located away from high-traffic areas and used exclusively for performing euthanasia. Since animals are sensitive to sights, sounds, and smells, the area should be constructed and maintained to minimize these stimuli, which otherwise may cause them unnecessary stress during the euthanasia process. Euthanasia areas and animal storage areas should also ideally be in areas not accessible to the general public or volunteers, both to preserve solemnity of the practice for the technicians and handlers involved and to avoid having the public experience sights and smells that may be misinterpreted. Basic handling equipment, first aid supplies, and a variety of needles, syringes and other tools should be readily accessible, as should enclosures designed to safely house animals in the process of losing consciousness.

An appropriate environment, along with competent, gentle handling techniques, can go a long way toward keeping animals relaxed and calm throughout the euthanasia process. An animal who is not stressed may be able to be euthanized without the administration of pre-euthanasia drugs, a benefit for everyone involved.



A typical euthanasia room

Layout and Design

As outlined in the *ASV Guidelines for Standards of Care in Animal Shelters*, each shelter should reserve a room specifically for conducting euthanasia. It is important to isolate the area from other shelter activities as much as possible to reduce the stress on the animals and to provide the staff with a safe and quiet working area. A well-appointed euthanasia room should have adequate space for at least two people and an animal to move around freely. Exam tables, cabinets, and other fixtures should be thoughtfully located to make for an efficient and comfortable workspace.

In smaller shelters, it may not be possible to devote a room exclusively to euthanasia. In such cases, the euthanasia area should be a section of the shelter that can be separated from the rest of the building by a partition or curtain. All other types of activities must be curtailed in that space while euthanasia is being performed.

Since animals with all stages of contagious diseases may enter the euthanasia area, it is crucial that no healthy animals pass through it on their way to or from other areas of the shelter. A separate door to the outside is ideal so that injured, sick, or quarantined animals can be brought directly into the room without having to pass through live animal holding areas. Ideally, the separate door should also provide access to a cooler, freezer, or vehicle for the removal of animal bodies.

A euthanasia room does not have to be a drab and somber place. It is very important to create an environment that is as comfortable as possible for the people who work there. The use of skylights, windows (provided that they do not open onto public areas), and inviting colors on the walls may help foster a more soothing mood in the area. Some shelters have murals, plants, posters, and quiet music in their euthanasia rooms. If there is a telephone in the room, the ringer should be turned off (as should personal cellular phones), since ringing and beeping can startle an animal during the euthanasia process. These considerations can help reduce some of the stress on the staff, which translates into less stress for the animals. They can also provide a more appropriate atmosphere for a pet owner who wants to be with their animal while the animal is being euthanized, if that is permitted by the organization.

IMPORTANT NOTE: With limitations to access to veterinary care, owner intended euthanasia (OIE) procedures are becoming more frequent in animal shelters. Shelters are rethinking how best to serve the public. A euthanasia room near the main entrance of the building with a separate egress should be considered. The owner with the animal can be ushered into that space to discuss the euthanasia decision and potentially be present for all or part of the process.



Example a comfort room at an animal shelter where the owner may be present for the euthanasia process

Lighting and General Environment

Lighting that is bright enough to provide clear visibility in all areas of the euthanasia room is very important, since shadows or dark areas may obscure the CET's view of a vein and make it difficult for the handler to observe the animal's behavior. Fluorescent lighting usually provides a uniform illumination that is not too bright for most animals' eyes. Two banks of lights, one on either side of the work area where animals are euthanized, provide excellent illumination with minimal shadows.

The air temperature in the room should be within a reasonable comfort range for humans and animals. Portable heaters and air conditioners are sometimes necessary if the room does not have sufficient environmental controls. Performance is enhanced when animals and people are comfortable.

It is essential to have good ventilation in the area to prevent the accumulation of odors. To minimize the transfer of airborne diseases into other areas of the shelter, the ventilation system for the euthanasia room should not be connected to the rest of the building's heating and air conditioning system. An exhaust fan vented to the outside of the building is recommended if there is no separate air exchange system built into the heating and air conditioning system.

Like all areas of the shelter, the euthanasia room must be able to withstand frequent cleaning and disinfecting. The floor of a euthanasia room is especially vulnerable to an accumulation of dirt and animal fluids and waste, and must therefore be completely sealed. If possible, a central floor drain should be installed to facilitate drainage. The floor should also have a durable non-slip surface to protect employees from falls when handling animals. All walls, cabinets, and other surfaces should be sealed with an epoxy-based paint or covered with a nonporous material for easy disinfection.

Recommended Equipment

Euthanizing animals is highly stressful for humans, physically as well as emotionally. Physical strain can be caused by lifting, holding, and restraining both live and deceased animals. A well-equipped work area that allows for flexibility in handling and managing animals is therefore essential.

While euthanasia can be performed exclusively on the floor, having a table or other elevated workspace makes the work much easier, particularly when euthanizing cats and small dogs. Ideally, a commercial-grade grooming or veterinary table will be available in the euthanasia room, as these typically can be raised and lowered to ensure that technicians are working at a comfortable height. If a shelter cannot afford a grooming or veterinary table, any wide, solid surface that is of a comfortable working height can be acceptable, provided it has a non-slip, easily disinfected surface (a stainless steel table covered with a rubber mat to provide secure footing for dogs can be a good choice).

In addition to the table, there should be a separate work surface and locking cabinets for holding syringes, needles, and other equipment. Assuming the shelter uses a computerized management system for recording and updating information regarding individual animals, a computer station should ideally be available in the euthanasia room for the CET to verify an animal's status and update records throughout the euthanasia process. A microchip scanner must be readily available to scan each animal immediately prior to euthanasia.

There should be one or more kennels, large transport cages, or banks of cages easily accessible near the euthanasia area. These are necessary to hold animals while waiting for pre-euthanasia drugs to take effect, or to securely house animals who have been administered an IP injection of sodium pentobarbital.

SPECIAL NOTE: Only one animal should be in the euthanasia room at a time.

Few employees can lift a large dog by themselves without risking back injuries. Veterinary grade stretchers can be useful in transporting heavy animals when they cannot move on their own. A flatbed cart or commercial bin container on wheels is also useful for removing animals. Remember that animal urine is highly corrosive and will cause ordinary metal or painted surfaces to deteriorate quickly, so stainless steel is best. No matter what method of transport is used, each animal body should be removed from the euthanasia room before the next conscious animal is brought in.

Syringes and Needles

Syringes and needles are discussed in Chapter 3: Introduction to Giving Injections.

Scale

Proper drug dosages are determined by an animal's weight, so having a scale available in a location convenient to the euthanasia room is essential. A walk-on scale is preferred for adult dogs and cats, and a baby scale works well for puppies, kittens,small mammals, and small wildlife. When weighing an adult dog or cat on a floor scale, if the dog will not stand long enough to get an accurate weight the handler may need to weigh him/herself holding the dog, then subtract their weight to obtain the weight of the dog (referred to as tare weight). If an animal is restrained in a trap or carrier, the same technique can be used but the weight of the container is subtracted, rather than the weight of the handler.

Electric Hair Clippers

Electric hair clippers are essential to ensuring that the CET has the best view of an animal's leg. Any of the brand-name grooming or hair clippers is acceptable, although a cordless commercial-quality model will provide fewer problems and last much longer than many of the less expensive models on the market. There is a wide range of blades available for clippers, but a No. 40 blade is used because of its ability to achieve a close cut. Be sure to follow the manufacturer's directions for cleaning and lubricating the clippers, because without proper care the clippers will burn out and must be replaced. A cooling spray (a specially formulated product) should be applied to clipper blades every few minutes of use on the leg of a matted or long-haired dog to prevent overheating of the blade, which can cause discomfort or burning. Use a toothbrush to remove hair and debris from the blades before applying the spray.

Other Recommended Supplies

In addition to the items mentioned above, there are additional items that should be present in every euthanasia room:

- While every shelter should have at least one comprehensive first aid kit on the premises, it is advisable to keep an additional kit in the euthanasia room in the event of a bite or a scratch.
- An OSHA approved eyewash station is recommended for accidental exposure to drugs (this is a requirement in some states). Alternatively, a manual eye flushing device must be easily accessible.
- A high quality stethoscope is useful for determining lack of heartbeat (CETs must be properly trained on using a stethoscope to verify death).
- All animals must be scanned again for a microchip with a universal microchip scanner prior to euthanasia, as a final opportunity to reunite lost pets with their owners (remember that metal tables, fluorescent lights and computers may interfere with a reader's ability to accurately identify a microchip.)
- Towels or a rubber pad can be used on the surface of the table or floor, under the animal, to minimize slipping and increase the animal's comfort; towels can also be used to darken cages and carriers for animals who have been given a pre-euthanasia drug.
- Cleaning and disinfecting supplies, including paper towels, disinfectant, squeegee, and plastic bags.
- Drug log book, along with calculator, drug dosage charts, paper writing pads.
- Computer station or laptop.
- Animal handling equipment including nets, control poles, etc.
- Crates, carriers or caging for animals who have been administered a pre-euthanasia drug, to allow the animal to pass through the stages of anesthesia in a secure and isolated environment.

CHAPTER 6

Pre-Euthanasia Drugs

Euthanasia occurs when an animal dies without fear or distress. Frequently, pre-euthanasia drugs are needed to alleviate fear, anxiety and stress (FAS) for the animal. In many shelters who use injectable drugs, to reduce FAS during euthanasia has become the standard of care. More recently, shelters recognized that FAS is also associated with handling and injection of pre-euthanasia drugs. To reduce FAS during pre-euthanasia drug injections, some shelters are incorporating oral pre-euthanasia drugs like trazodone, gabapentin and/or clonidine into their euthanasia protocols.

Planning for how to perform each euthanasia humanely and safely is critical and involves low stress handling, sedation and anesthesia. Typically, the decision to euthanize an animal and the actual act of euthanasia does not occur contemporaneously except in urgent circumstances. This means that the CET can put a plan in place that is best for the animal and the CET.

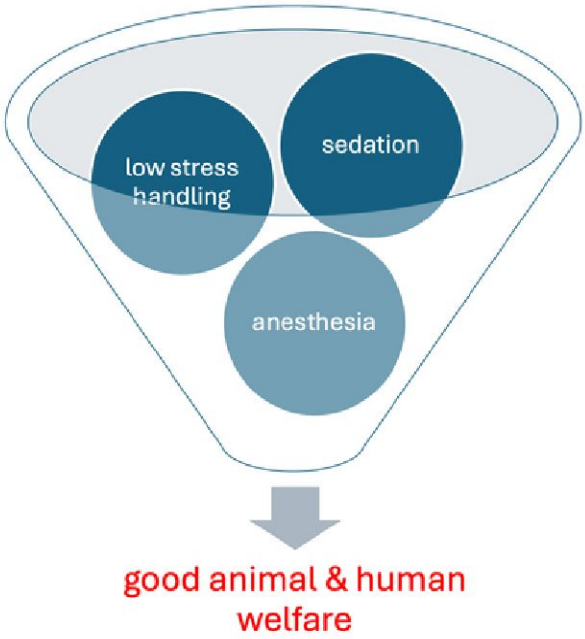
The plan includes:

- Reviewing the medical and behavioral records.
- Observing an animal's behavior in the shelter.
- Determining if oral pre-euthanasia drugs are indicated, are available and if the animal will take them.
- Determining if injectable drugs are needed and what desired effect is needed, sedation or anesthesia.
- Knowing legal requirements for pre-euthanasia drugs. Injecting euthanasia by the intracardiac route requires the animal to be anesthetized. Some states require pre-euthanasia sedation.

The CET may determine that the animal, the route of delivery of the euthanasia drug and the behavior of the animal makes direct injection of the euthanasia drug without oral or injectable pre-euthanasia drugs appropriate. (Example: A friendly, relaxed cat may be given an injection of sodium pentobarbital IP without any pre-euthanasia drugs).

Frequently, the CET, after evaluation of the animal, determines that pre-euthanasia drugs are indicated. Drugs that are used are typically given by injection. Oral drugs prior to injectable pre-euthanasia drugs are implemented less frequently.

Good Animal Welfare During Euthanasia



As a rule, all aspects of euthanasia should be performed out of sight and hearing of other animals (as well as members of the public and volunteers); even the administration of pre-euthanasia anesthetics is optimally performed in a separate euthanasia room. However, in some cases putting an animal in a net or on a control pole and forcing him or her into the euthanasia room for injection of a pre-euthanasia drug may put employee safety at risk and may cause undue distress, not just for that animal but for all of the other animals who see and hear the struggle. In those cases, discretion may dictate that the animal be anesthetized inside a kennel, then transported to the euthanasia room after loss of consciousness. Care must be taken; however, to limit exposure of other animals to any portion of the euthanasia process (for example, blankets and towels can be effective ways to block animals' views, etc.).

The Ideal Pre-euthanasia Drug

The ideal pre-euthanasia drug has the following properties:

- Reliable
- Works quickly
- Minimal side effects
- Given by multiple routes
- Inexpensive
- No need for additional record keeping

It is well established that the injectable pre-euthanasia drugs used in shelters, ketamine/xylazine, tiletamine/zolazepam and ketamine/xylazine/tiletamine/zolazepam are reliable and work quickly. Common side effects associated with the pre-euthanasia drugs include pain at the injection site, and, in some instances, vomiting.

Most pre-euthanasia drugs are not expensive with a few exceptions. Some are controlled substances that must be handled and secured just as strictly as sodium pentobarbital to ensure compliance with state and federal laws. Many pre-euthanasia drugs are restricted by state law to use by or on the order of a licensed veterinarian. Shelters without a veterinarian on staff should work closely with a local veterinarian to create guidelines and procedures for the use of drugs, and must be careful to honor their relationship with that veterinarian by strictly complying with those guidelines and procedures.

Vaccines are administered under the skin (SQ), pre-euthanasia drugs into muscle (IM) (typically), and sodium pentobarbital into veins (IV)—but why?

The appropriate routes of administration for each drug are clearly marked on the label, and are based on factors like how quickly the drug needs to be circulated for maximum effect (for example, vaccines should be absorbed more slowly than other types of drugs, so they are administered SQ). Administration of any drug in a manner not prescribed by the manufacturer's label is unlawful in the United States.

Types of Pre-Euthanasia Drugs

Just as important as the decision whether to use a pre-euthanasia drug is the selection of which drug is most appropriate. The best pre-euthanasia drugs are anesthetics, drugs that quickly render the animal unconscious with a total loss of ability to feel pain and that have minimal side effects. Although no drug is perfect, for dogs and cats, tiletamine/zolazepam, (Telazol, Tizolan) or a combination of the drugs xylazine and ketamine (commonly referred to as "PreMix") as well as the combination of tiletamine/zolazepam, ketamine and xylazine (known as TKX) are currently the preferred drugs for pre-euthanasia. Other drug combinations for pre-euthanasia sedation or anesthesia may be chosen by the shelter veterinarian. Frequently the drugs prescribed reflect the drugs the doctor uses for surgical procedures.

Sedation

Remember that planning is critical. Part of the plan is identifying the need for sedation so that euthanasia occurs without fear, anxiety or stress (FAS). Sedation will not cause complete anesthesia but will induce a relaxed state. (Remember that sedated animals may become aroused and react without showing the typical phases of aggression. Care should be taken when working with sedated animals.) Sedating drugs are given either by the oral, transmucosal (on the mucosa or OTM) or injectable routes. Oral sedating drugs such as trazodone, gabapentin and/or clonidine as well as other drugs are frequently used in shelters to reduce FAS. These drugs may also be given for that purpose prior to euthanasia. These drugs are typically given orally the night before and at least two hours before euthanasia.

Other drugs like alprazolam, given orally, or dexmedetomidine and medetomidine which are given transmucosally in a carrier like peanut butter, may cause sedation in less than 30 minutes and may be given a short time before euthanasia. Injectable sedating drugs like xylazine, dexmedetomidine, acepromazine, etc, may work within minutes and become effective.

Some of these drugs may be federally controlled substances like alprazolam (CIV). Other drugs may be considered a controlled drug in some states. Gabapentin is an example of a drug that may be a controlled drug in certain states. Note that when a drug is controlled at the state level the bottle does not have a controlled substance demarcation. It's important to stay up to date on your state's law.

Anesthesia

Injecting an anesthetic drug prior to euthanasia may also be part of the plan. The availability of these drugs may be restricted in shelters in some states. In other states, these drugs may be required prior to euthanasia. Many shelters have incorporated anesthetic pre-euthanasia drugs into their euthanasia standard operating procedure. The conventional shelter anesthetic pre-euthanasia drug is "PreMix."

PreMix (Xylazine/Ketamine)

When the drugs xylazine and ketamine are used in combination at appropriate dosages (this is commonly referred to in the United States as "PreMix"), the animal is put into a deep plane of anesthesia—unconscious, unable to move, and unresponsive to even deep pain stimuli (the conscious perception and response to a noxious stimulus). The animal has no blink reflex or toe pinch reflex, but still retains good circulation and blood pressure (meaning sodium pentobarbital can be administered intravenously safely and effectively).

While PreMix is in most cases a very good choice for pre-euthanasia anesthesia, CETs must be aware of its potential drawbacks. The animal does experience a stinging sensation when any drug is administered intramuscularly, so care must be taken to inject properly. Injecting slowly into a large muscle mass (the back muscle is ideal, since it ensures smooth absorption of the drug; also acceptable is the large muscle of the back leg) is the best way to alleviate pain to the extent possible. PreMix does have the potential to induce seizures or vomiting, so the animal must be closely monitored after administration. Finally, there are administrative complications with using PreMix—ketamine (and in some states, xylazine) is federally controlled, so the resulting combination of the two drugs must be treated as a controlled substance.

To make PreMix, first ensure that xylazine and ketamine are added together at a ratio of 1 part xylazine to 5 parts ketamine (for example, add 2 mls of large-animal xylazine (1 mg/lb, 100 mg/ml) to a standard 10 ml vial of ketamine (5 mg/lb), creating a 12 ml bottle of PreMix that can be dosed for individual animals as needed).

IMPORTANT NOTE:

- Ensure that a new label is placed onto the vial of mixed drugs that specifies the names of the drugs mixed, the amounts of each drug, the date mixed, and the initials of the individual who prepared the mixture.
- In some states mixing two drugs together is considered compounding and may be illegal. Check your state laws.

The proper dosage for administration of most formulation of PreMix as a pre-euthanasia anesthetic is 0.5 ml/10 lb. IM. An animal who has been administered PreMix will generally feel the full effects of the drugs between 3-5 minutes and will remain anesthetized for 30 to 40 minutes before regaining consciousness.

Remember, because ketamine is a Schedule III controlled substance, be sure to record and track the use of this combination product in detail in the controlled substance logbook, as required by law. Xylazine is a controlled substance in many states and likely will soon become a federally controlled drug.



PreMix bottle, labeled

Other drugs used for anesthesia prior to euthanasia include:

- Tiletamine/zolazepam at a dose of 0.5 ml per 10 lbs IM.
- TKX or ketamine (100 mg/ml, 4 ml), xylazine (100 mg/ml, 1 ml) added to tiletamine/zolazepam. The dose for TKX is 0.15 ml per 10 lbs.

> Increasing the dosage of a pre-euthanasia drug generally does not speed up the drug's effects, it only extends the length of time that the animal feels the influence of the drug.

Tiletamine/Zolazepam (Telazol)

Like PreMix, tiletamine/zolazepam also provides deep anesthesia. The animal quickly becomes unconscious, immobile and unable to feel pain, allowing for all routes of injection of sodium pentobarbital. It is particularly recommended as a pre-euthanasia drug because it stings less than PreMix does on injection.

Tiletamine/zolazepam is used as an anesthetic in veterinary practice for minor surgical procedures because it provides rapid unconsciousness, analgesia and good muscle relaxation. The drug begins to take effect within 10 minutes of IM administration and lasts for approximately 30 minutes before the animal starts to wake up.

Although tiletamine/zolazepam is an excellent choice as a pre-euthanasia drug it can be fairly expensive, and it has a short shelf life once it has been reconstituted (meaning sterile water has been added). It must be refrigerated to maintain potency for more than a few days. These are two important considerations that a shelter should weigh before selecting tiletamine/zolazepam as the only pre-euthanasia drug they have available for dogs and cats; many shelters elect to use PreMix for dogs and reserve tiletamine/zolazepam for cats, because the lower doses required for cats alone make it much more cost effective.

Tiletamine/zolazepam typically comes in powder form in small 5 ml bottles and must be reconstituted with 5 ml of sterile water. Draw 5 ml of sterile water into a syringe and inject it directly into the bottle of powdered tiletamine/zolazepam, then roll or gently shake the bottle to ensure thorough mixing. The reconstituted solution remains effective for only seven days when stored at room temperature; it can last up to fifty-six days when kept refrigerated. It is important to label each bottle of tiletamine/zolazepam with the date it was reconstituted to ensure that its expiration date is apparent.

In most settings, tiletamine/zolazepam, like PreMix should be administered by IM injection into the back muscle or rear thigh muscle of the animal (in certain cases subcutaneous administration can be performed, but for use in companion animals IM injection is preferred). While the injection does sting, it is not quite as painful as injection of other drugs. The label dose of tiletamine/zolazepam is 0.3–0.45 ml/10 lbs IM; however, best practice is to use 0.5 ml/10 lbs. to achieve full anesthetic effect.

Tiletamine/zolazepam is a Schedule III controlled substance and must be strictly handled and secured to comply with federal, state, and local laws.



Telazol

Tiletamine/Zolazepam + Ketamine + Xylazine (TKX)

TKX is made by reconstituting the tiletamine/zolazepam powder with 4 mls of ketamine (100 mg/ml) and 1 ml of xylazine (100 mg/ml). At a dose of 0.15 ml per 10 lbs this combination provides a surgical plane of anesthesia. This combination is much more stable than tiletamine/zolazepam because of the stabilizers and preservatives present in the ketamine and xylazine used for reconstitution. This combination is also less costly since the dose used is one third the dose of tiletamine/zolazepam.

IMPORTANT NOTE:

- Ensure that a new label is placed onto the vial of mixed drugs that specifies the names of the drugs mixed, the amounts of each drug, the date mixed, and the initials of the individual who prepared the mixture.

IMPORTANT NOTE:

- In some states mixing two drugs together is considered compounding and may be illegal. Check your state laws

Some shelters use other combinations of anesthetic drugs that are prescribed by their veterinarian. Examples include:

- BDK or butorphanol/dexmedetomidine ketamine
- TTDex or tiletamine/zolazepam/ butorphanol/dexmedetomidine

Xylazine

Recently xylazine has been used for illicit purposes on the street, where it is known as “tranq” and used to cut fentanyl. In many states it is now a controlled substance and there is current legislation pending at the federal level to make it a controlled substance (CIII).

In shelters, xylazine is not recommended for use as a pre-euthanasia drug by itself because: a) it commonly causes vomiting, particularly in cats and in any animal who has recently eaten; b) though sedated, the animal remains conscious, and may react violently to sudden noises and movements; c) may reduce the animal’s natural bite inhibition, making them potentially more dangerous to handle; and d) lowers the animal’s blood pressure to the point that injection of sodium pentobarbital for euthanasia may be difficult. For these reasons, in small animals, xylazine is only recommended for use when combined with another drug (like ketamine to create PreMix), may temper potential negative effects.

Large animals, like cattle or horses, may receive xylazine alone to achieve a standing sedation prior to euthanasia.

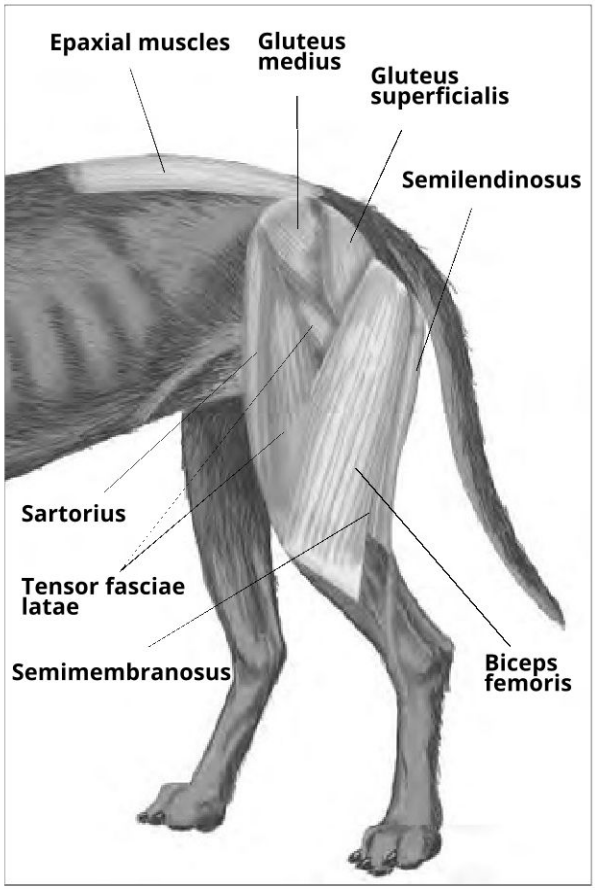
Pre-euthanasia drugs should not be "dosed for effect"—the specified amount should be given by weight regardless of whether the animal is pregnant, elderly, heavily muscled, etc.

Administration of Pre-Euthanasia Drugs

Most pre-euthanasia drugs are injected directly into the animal's muscle tissue (intramuscular, or IM, injection), typically using a small gauge needle to help reduce the sting and ensure that the drug is injected into muscle, not bone. The most common location for this type of injection is in the lumbar muscle along the spine or the large muscle of the rear thigh. Each of the pre-euthanasia drugs discussed above produces a distinct stinging sensation on administration, which is likely to cause even the most cooperative animal to react. Just as is the case with direct injection of sodium pentobarbital, each animal should be gently but securely restrained before an IM injection is administered.

Unlike direct injection of sodium pentobarbital where a bolus effect is preferred (injection of a large quantity of drug at one time), when injecting pre-euthanasia drugs it is important to inject slowly in order to minimize the pain caused by the drug entering the muscle tissue; an experienced CET will look to balance the need to inject slowly, to minimize the animal's pain, with the desire to finish the process quickly so as to lessen the stress induced by handling the animal.

IMPORTANT NOTE: Pre-euthanasia drugs are typically administered to animals that are fractious or feral, making accurate placement of an injection difficult. Nevertheless, it is unacceptable to simply inject an animal randomly in any accessible location—CETs must ensure that IM injections are made only into muscle tissue. Tools such as restraint gates, etc., should be used to ensure that the animal is sufficiently immobilized to allow for accurate injection.



Muscle masses in rear leg of dog, appropriate for IM injection of pre-euthanasia drugs

Standard syringes (e.g., 1cc or 3cc) and small gauge needles are typically used to administer pre-euthanasia drugs, depending on the volume needed. The injection should be delivered at a 90 degree angle to the skin, directly into the largest accessible muscle mass (typically the thigh of the rear leg). The technician holds the syringe with one hand, with thumb ready to push the plunger and gently but firmly grasps the leg to be injected with the other hand to help steady the animal. The CET then aspirates to ensure that the needle is not in a blood vessel, then inserts the needle and injects the full amount of the drug as slowly as the animal will permit.

In some cases it may be excessively difficult or dangerous to use a traditional syringe. Each shelter should have at least one alternative injection device, such as a syringe pole, if available. A syringe pole is a fairly inexpensive piece of equipment that may be used to safely and humanely administer a pre-euthanasia injection to a wild or fractious animal. The syringe, at the end of a 3-5 foot pole, is filled with the drug just as it would be for a normal injection. The syringe pole simply serves as an extension of the technician's arm, allowing them to administer the drugs from the plunger on the end of the pole while maintaining a safe distance from the animal.

A short, but stout needle is inserted into the muscle of the hind quarters of the animal, and the plunger on the end of the syringe pole is pushed gently to inject the drug. The animal is immediately released following the injection into a secure, dark, quiet area while the drug begins to take effect.

Some agencies still use traditional pole syringes, in which there is no plunger to be depressed by the technician, rather the jabbing motion itself is used to push the drug through the syringe (akin to a harpoon). A technician operating a traditional pole syringe has much less control over the injection process than that available when using a safety stick, and is more likely to induce pain to the animal, so safety sticks are preferable. If only a traditional pole syringe is available, a technician can enhance the level of control over injection by looping the ring of a traditional flat leash over the needle and using a slow but steady pulling motion to regulate the rate of drug injection (a rubber stopper, like those used to block the end of a test tube, can be applied over the needle to provide a base of resistance and limit how much needle can pierce the animal's skin, but the very act of applying the stopper will dull the needle).

IMPORTANT NOTE: As stated above, an IM injection must be delivered into muscle. It is not permissible to simply inject into any accessible skin of the animal. Trying to accurately inject animals with a safety stick or pole syringe while they are loose in a cage is nearly impossible. Animals who will be injected using this tool should first be confined to a smaller space using a press gate, squeeze cage, or other device to ensure accurate injection. It is never appropriate to simply stab at an unsecured animal and possibly inject it into a non-muscled area.

As the animal begins to feel the effects of the drug, they will typically start to lick their lips, as though experiencing an unpleasant taste in the mouth, lose the ability to focus vision (the eyes will often dart from one side to the other, as though the animal is watching a tennis match), and then lose coordination and begin to drop to the floor. Although the animal is not experiencing any pain during this time, the handler should take care to ensure that they do not stumble into equipment or otherwise injure themselves and that they drop gently to the floor. The CET should also monitor for any seizures or vomiting (in which case it is critical to ensure that the animal does not choke on its own vomit before sodium pentobarbital can be humanely administered).

IMPORTANT NOTE: Just as with sodium pentobarbital, while the animal is experiencing the effects of a pre-euthanasia drug, they can enter an excitement phase and lose normal bite inhibition. Handlers must ensure that they and other staffers remain safe until the animal has fully lost consciousness.

A note on pre-euthanasia drugs

All pre-euthanasia drugs have potential side effects, and two animals of the same breed and size may react very differently to the same type and dosage of drug, making administration somewhat complicated. In fact, if the wrong drug is selected, or if the animal has an unanticipated reaction to the drug, the animal can actually become more dangerous. This is especially concerning since routine use of pre-euthanasia drugs may give staff a false sense of security when working around fractious or aggressive animals. They may begin to rely on the use of drugs as a substitute for safe and compassionate handling of every animal.

Inhalant Anesthetics (e.g., Halothane, Isoflurane)

When euthanizing very small rodents or birds, injection can be extremely challenging. In such cases, liquid inhalant anesthetics such as isoflurane or halothane (no longer available in the United States) can be used to induce rapid unconsciousness and death.

Inhalants work on the principle of displacing oxygen with an alternate gas; because the body's organs require oxygen to function, when another gas is inhaled the body begins to shut down, and death is inevitable.

Whether or not this death is considered to be humane depends on what happens between the time that the animal first inhales the gas and the time he or she loses consciousness. If the process is almost immediate and completely pain free, death can be considered humane. If the animal experiences any physical or psychological distress or suffers in any way before he or she loses consciousness, the death is inhumane.

Many variables affect whether or not a death by an inhalant anesthetic is humane, including the physical effects of the inhalant itself, the method by which the inhalant is delivered, and even the individual animal's reaction to the inhalant.

Inhalant gases like chloroform and ether are not acceptable inhalants for use in euthanasia in part because of the risk of bodily harm they pose to humans (they are a possible carcinogen and can cause liver damage).

Technically speaking, inhalant anesthetics can be used as either as direct euthanasia agents or as pre-euthanasia drugs. However, it is advisable that an appropriate dose of sodium pentobarbital be injected into animals who have been rendered unconscious with the use of an inhalant anesthetic in order to ensure that death is achieved as rapidly as possible.

Sodium Pentobarbital as a Pre-euthanasia Drug

Sodium pentobarbital administered orally may serve as a pre-euthanasia agent. The effects depend on the dosage; animals may become sedated or anesthetized, and ingestion of sufficient quantities can result in death. Delivering a lethal oral dose is challenging due to the drug's bitter taste, which most animals find unpalatable. It may be concealed in highly palatable foods to encourage consumption, particularly in dogs. However, cats generally do not willingly ingest food containing sodium pentobarbital.



The use of Sodium Pentobarbital in its powder form might not be legal in your state.

Oral Administration (PO, per os, latin for "in the mouth")

(squirting drug directly into animal's mouth or mixing it into food)

Primary Advantages

- Useful for fearful, anxious and stressed (FAS) animals that are unsafe to handle.

Primary Disadvantages

- Expressly prohibited in certain states;
- The drug has a bitter taste, making it difficult to get enough of the drug ingested to achieve death (therefore it will likely have to be followed up with IV or IC injection). This route of sodium pentobarbital delivery is more effective as a pre-euthanasia drug;
- Should be limited to rare cases of extremely fractious animals that cannot be safely and humanely handled by any other means.

CHAPTER 7

Sodium Pentobarbital

Sodium pentobarbital belongs to a large family of drugs known as barbiturates. First used clinically about the turn of the 20th century as medical hypnotics, barbiturates like sodium pentobarbital served as the basis for many types of anesthetic agents used for human and veterinary surgery. When used as surgical anesthesia, a barbiturate is dosed to safely cause short-term unconsciousness and loss of pain for the required duration. When used for euthanasia, barbiturates in general, and sodium pentobarbital in particular, are used at doses higher than would be used in surgery in order to quickly and completely depress the animal's central nervous system, resulting in death.

How Sodium Pentobarbital Works

Sodium pentobarbital is an effective euthanasia agent because of its effect on brain function. When introduced into the bloodstream, sodium pentobarbital moves rapidly to the heart and then into the brain, where it quickly and painlessly depresses all vital life functions. A lethal intravenous dose of sodium pentobarbital causes a mammal to lose consciousness within seconds, and results in clinical death within just minutes.

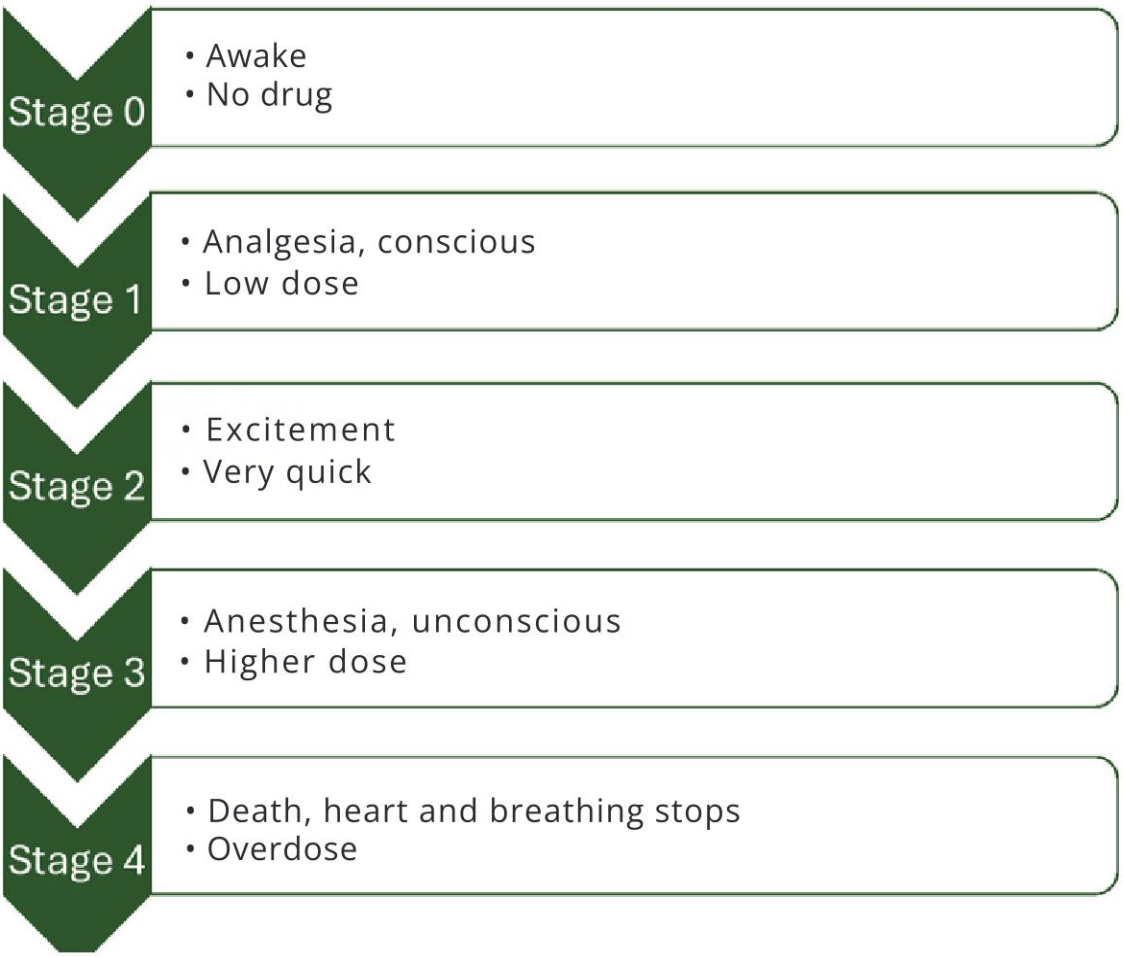
To understand how the drug works, why it is considered to be the most humane method of euthanasia available for virtually all animals, and how to recognize and correct potential problems after the drug has been administered, one must understand the stages of anesthesia that each animal undergoes once the drug has been introduced to its system. Each stage is identified by physiological changes within the animal's body.

While sodium pentobarbital typically works so quickly and effectively that it can be difficult to discern when the animal is moving from one stage to another, it is nevertheless crucial for CETs to understand the process in order to appreciate how the drug so successfully provides a humane death.



Typical euthanasia drugs

Remember that sodium pentobarbital is an anesthetic and that its effects on the brain are dose dependent. This means that as the dose is increasing more of the brain is affected by this drug. When performing euthanasia, the animal will pass through the stages of anesthesia. These stages may not be evident depending on the dose route used. Sodium pentobarbital travels to the brain by the circulatory system which means that some routes like the intraperitoneal route take much longer to have an effect and therefore all the stages of anesthesia are more likely to be seen. The four stages of anesthesia are Analgesia, Excitement, Anesthesia and Overdose. The stages of anesthesia correlate with different regions of the brain.



The three regions of the brain that are associated with anesthesia stages, are the forebrain (cerebrum), the middle brain, and the brainstem. The forebrain is the area activated during the Analgesia and Excitement stage.

The forebrain is the newest part of the brain and is the most sensitive to sodium pentobarbital. It needs very little of this drug to impact how it works. Low doses of sodium pentobarbital initially causes analgesia or the reduction of pain without causing altered mentation.

As the dose in the forebrain increases the animal traverses into the Excitement stage of anesthesia. In this stage animals pass from mild to more profound motor signs like paddling and vocalizing.

The middle brain is affected by an intermediate dose of sodium pentobarbital resulting in a surgical plane of anesthesia documented by an absence of reflexes.

This is the stage of anesthesia that must be achieved to perform invasive procedures lke surgeries or intracardiac injections for euthanasia purposes.

The brainstem (medulla oblongata) is the oldest part of the brain and the most resistant to the effects of sodium pentobarbital. This part of the brain is where the nerves for vital functions like temperature, heartbeat, respiration and blood pressure reside. Euthanasia causes cessation of activities of these nerve centers.

Injection of sodium pentobarbital for the purposes of euthanasia is a planned overdose of this drug. The brainstem is the oldest part of the brain and is more resistant to sodium pentobarbital, so a dose three times the dose necessary for surgical anesthesia is necessary.

Stage I: Analgesia

The forebrain (cerebrum) is the newest part of the brain and is the most sensitive to sodium pentobarbital. The forebrain needs very little of this drug to impact how it works. Low doses of sodium pentobarbital initially causes analgesia without a loss of consciousness.

As the animal begins to lose consciousness and coordination, they may become increasingly sensitive to noise, touch and other stimuli. Gentle, safe restraint and a quiet environment are essential to minimize excitement during this stage. As the drug passes through the forebrain (cerebral cortex), the animal quickly begins to lose the ability to feel pain (although they can still feel "deep" pain) and loses voluntary motor skills.

IMPORTANT NOTE: CETs should be aware that when sodium pentobarbital moves through the brain it also shuts down the animal's normal inhibitory centers which typically keep the animal from biting; when this happens, the disorientation the animal is experiencing can cause even the gentlest soul to react. Luckily, sodium pentobarbital works so quickly when given intravenously that CETs are rarely harmed, but it is important to be aware of the possibility and keep the animal safely restrained until complete loss of consciousness occurs.

Stage II: Excitement

As the dose of sodium pentobarbital in the cerebrum increases the animal traverses into the Excitement stage of anesthesia. The imbalance resulting from the presence of the drug in this region frequently causes uncontrolled motor activity like paddling of the legs and vocalizations; although this may be disconcerting to see, the animal is not aware of their surroundings and not suffering.

Stage III: Anesthesia

The middle brain is affected by an intermediate dose of sodium pentobarbital resulting in a surgical plane of anesthesia documented by an absence of reflexes.

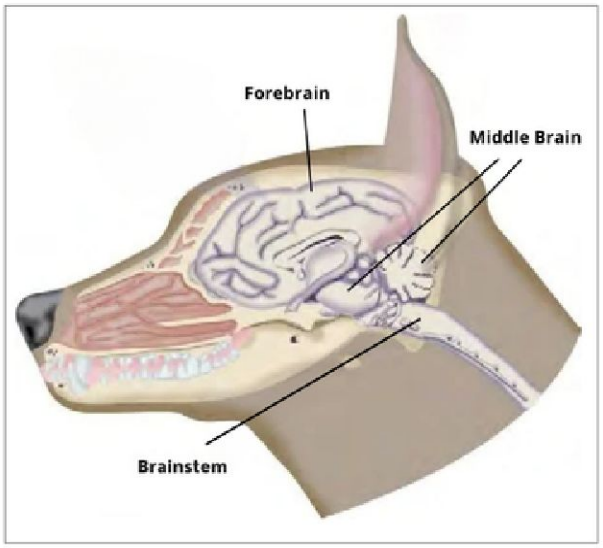
Once the drug has made its way through the cerebrum, it enters the middle brain, which includes the thalamus, pons, midbrain and cerebellum. At this point the animal feels no pain at all and does not respond to visual or auditory stimuli, and all reflexes (including eye blink and toe pinch) disappear. The animal is in a state of surgical anesthesia and could be safely and painlessly operated on (provided vital signs—heartbeat and respiration—are maintained). If sodium pentobarbital has been injected into a vein, the animal generally reaches this stage as soon as 4-5 seconds after injection.

How fast does sodium pentobarbital work?

Typically, within five seconds after injec- tion into a vein the animal is unconscious; within 20 seconds the animal stops breathing; within 40 seconds the animal is considered "medically dead" (meaning the heart has ceased circulating blood); and within two minutes the animal is "clinically dead" (meaning all voluntary and involuntary functions have ceased, although muscle twitching may continue for several minutes).

Stage IV: Overdose

The brainstem (medulla oblongata) is the oldest part of the brain and the most resistant to the effects of sodium pentobarbital. This part of the brain is where the nerves for vital functions like temperature, heartbeat, respiration and blood pressure reside. Euthanasia causes cessation of activities in this region. Injection of sodium pentobarbital for the purposes of euthanasia is a planned overdose of this drug. Because the brainstem is the oldest part of the brain it is more resistant to sodium pentobarbital. Therefore, to euthanize an animal, a dose three times the dose necessary for surgical anesthesia must be given.



The anatomy of the brain

Areas of the brain associated with the stages of anesthesia.

- Forebrain associated with analgesia and excitement phase.
- Middle brain associated with anesthesia where reflexes are absent.
- Brainstem associated with vital functions (temperature, pulse, respiration and blood pressure). Cessation of activity here results in coma and death.

When sodium pentobarbital is given intravenously or by the intracardiac route it effectively stops the animal from breathing in oxygen and circulating blood usually within just 40 seconds after injection. When the vital functions cease, the animal dies.

It is important to understand that even after the vital core functions have ended and death has been confirmed, the animal may have muscle fasciculations, or the animal may audibly appear to gasp (called agonal breathing). These are not conscious, voluntary responses by the body or indications that the animal is "fighting for life." Agonal breathing is simply the body's reflexive attempt to address its shortage of oxygen; the animal is not actually breathing, or attempting to breathe, in a manner that would sustain life. Knowing the difference between actual life signs and involuntary death responses is a critical part of performing euthanasia.

IMPORTANT NOTE: It is not enough to simply inject an animal with a lethal dose of sodium pentobarbital and assume that they have been euthanized. Euthanasia is not complete until death has been verified.

If sodium pentobarbital has been injected directly into a vein, the animal typically passes through all four stages of anesthesia in a matter of seconds; if the drug has instead been injected into the abdominal cavity, the process will take longer simply because the drug must first be absorbed into the bloodstream and then be carried from the heart to the brain. No matter what method is used, a well-trained, experienced CET can recognize when an animal is not following the typical timeline for the stages of anesthesia, and make necessary corrections to the process.

CHAPTER 8

Injection Routes for Euthanasia

Sodium pentobarbital may be administered to an animal in several ways: IV (intravenous, injection of drug directly into a vein), IP (intraperitoneal; injection of the drug into the abdominal cavity), IC (intracardiac; injection of the drug directly into the heart), or PO (per os; oral administration of the drug). Each method has advantages and disadvantages. A qualified CET should be comfortable utilizing each of them and should select whichever method will provide the most humane euthanasia for the individual animal under the circumstances.

Intravenous (IV)
(injection of drug directly into a vein)

Primary Advantages (IV)

- Can be used on virtually any animal, regardless of age or species;
- Can be used on conscious or unconscious animals;
- Appropriate veins are typically readily accessible;
- Causes minimal distress or pain when proper technique is used;
- Results in rapid death, as the drug is introduced directly into the circulatory system;
- Allows technicians to hold and comfort the animal during the euthanasia process;

Primary Disadvantages (IV)

- The close contact with the animal required for direct injection into conscious animals can cause undue stress for some animals or can put technicians at undue risk of injury if the animal is fractious
- The medical condition of the animal can make locating and injecting into veins a challenge
- It generally cannot be used on very tiny animals whose veins are too small for injection

Intraperitoneal (IP)
(injection of drug into the abdominal cavity, the gap between organs and the abdominal wall)

Primary Advantages (IP)

- Can be used with the very youngest or smallest of mammals, where finding a vein is a challenge
- Often preferred for use on conscious, well-socialized adult cats because it does not require invasive handling
- Restraint of the animal for IP injection does not put the euthanasia tech near the animal's teeth or claws as restraint for IV injection
- Virtually pain free for the animal when performed correctly

Primary Disadvantages (IP)

- Improper injection can result in drugs introduced into fat or organs, making absorption less effective and potentially causing pain to the animal;
- Takes a longer time before unconsciousness and death, because the drug must first be absorbed into the blood stream before being carried to the heart and brain;
- The animal must be held in a safe, quiet, secure area after drug administration until they fully lose consciousness;
- Requires a much larger volume of sodium pentobarbital than other methods;
- Can be perceived as painful by those who misunderstand the technique (an untrained individual may not understand that there are no nerve endings along the linea alba, for example, and may inaccurately assume that IP involves a painful injection into the animal's stomach);
- Should not be used on adult dogs because of an increased chance that they will experience a prolonged excitement phase.

Intracardiac (IC)
(injection of drug directly into a chamber of the heart)

Primary Advantages (IC)

- Ensures the fastest delivery of drugs of any method (because the drug has a direct route from the heart to the brain)

Primary Disadvantages (IC)

- Tremendously painful for conscious animals, so it must never be used unless the technician has confirmed that the animal is fully unconscious
- Aesthetically unpleasant to observe (therefore not appropriate for cases where the owner or another member of the public is present, even if the animal is unconscious), and often misunderstood by members of the public

It is the responsibility of a well-trained euthanasia technician to determine which mode of administration is most appropriate for use on a particular animal, based on species, age, medical condition and temperament.

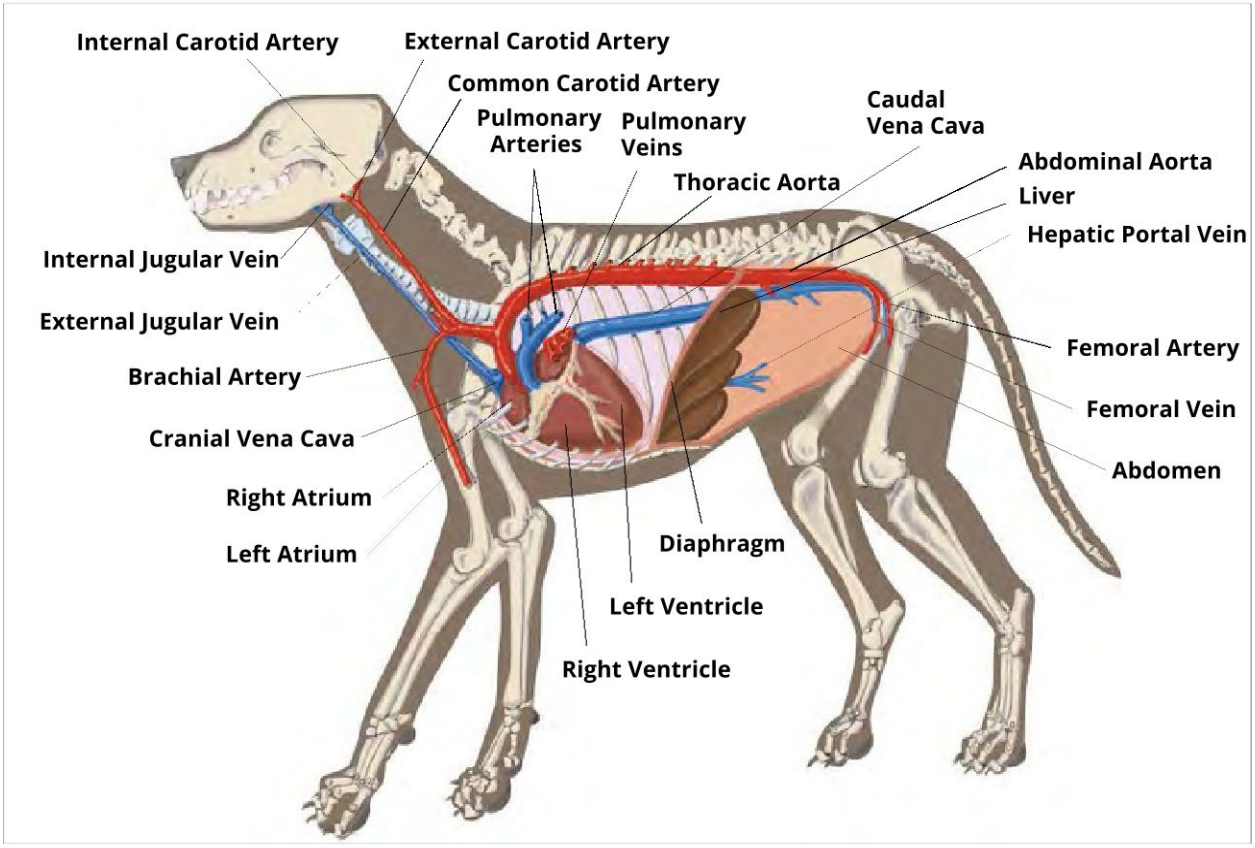
Intravenous (IV) Injection

(Injection of sodium pentobarbital directly into a vein)

Intravenous (IV) injection involves the injection of sodium pentobarbital directly into the animal's vein, where the drug is carried by the circulatory system to the heart and then on to the brain. Once the proper quantity is injected, loss of consciousness is nearly instantaneous, and death quickly follows. Because there are no nerve endings inside veins, the only pain an animal feels in connection with IV injection is the initial prick of the needle piercing the skin. With education, training, and practice, a CET can become extremely proficient at minimizing this needle sting and can "hit" (locate and enter) the vein on the first try virtually every time, creating a very humane and nearly painless experience.

IV injection is the most flexible type of injection in that it can be used on virtually any animal, with few restrictions for age or health. It also has the unique advantage of being appropriate for use on conscious dogs, because it is virtually painless and because it does not require handling that most dogs find uncomfortable or invasive.

Well-socialized dogs can be gently restrained while a CET injects the drug directly into a leg vein (for this reason, IV injection into a conscious animal is often referred to as "direct injection"). Using this direct injection method, the dog receives the benefit of close, comforting human contact in the last moments and avoids the pain that accompanies the injection of most pre-euthanasia drugs.



Circulatory system of a dog

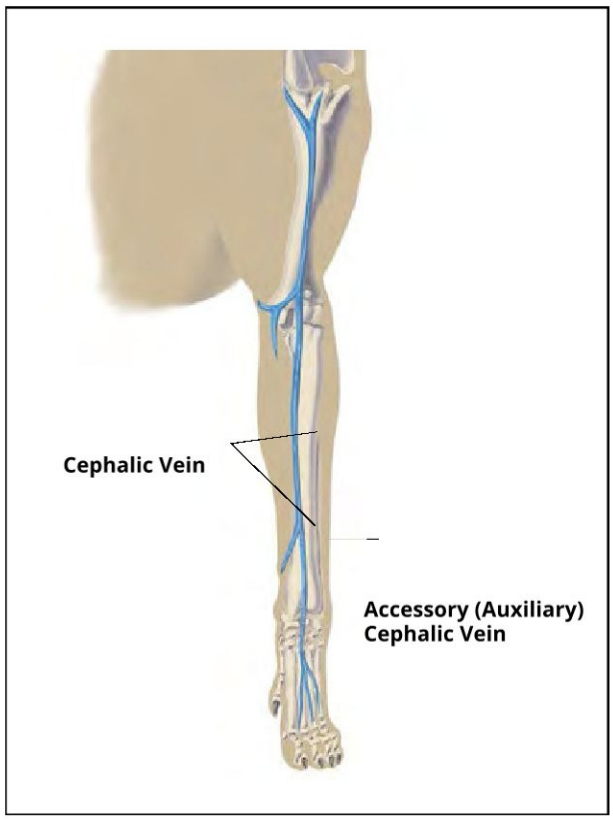
Selecting Veins for IV Injection

IV injection can be performed on any of several veins throughout an animal's body. When selecting a vein, a CET should consider factors such as the species of animal, the size of the animal, and whether the animal will be conscious or unconscious when the injection is given. Another important consideration is the CETs personal preference and comfort level. Some people are simply more adept at "hitting" veins (successfully administering IV injection) in an animal's front legs than back legs, or vice versa. Any vein can be acceptable provided accessing it doesn't place any undue stress on the animal (assuming the animal is conscious).

No matter which veins are preferred. However, CETs must be capable of locating and successfully injecting into any of them, because the animal's front or rear leg veins may be unavailable due to illness or injury, and because even the most skilled technicians can "blow" veins), requiring them to move from one leg to another to achieve successful injection.

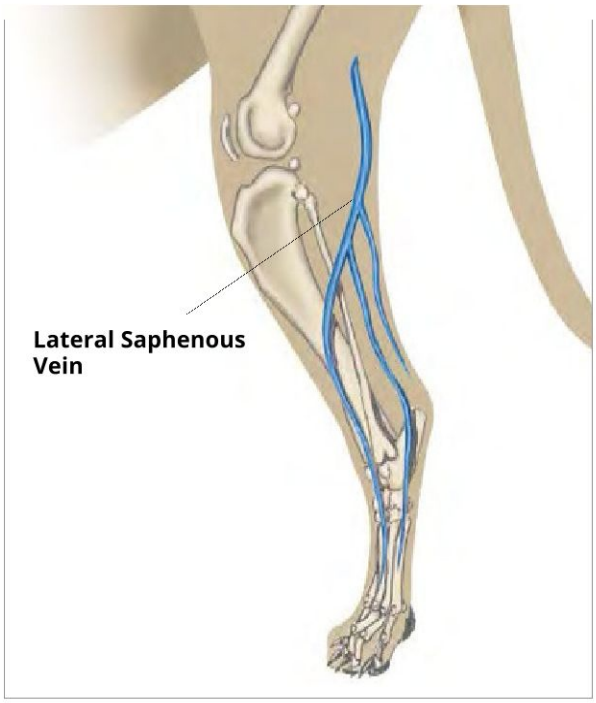
There are four pairs of veins that can be used for IV euthanasia injections in mammals (it is up to the discretion of the CET to determine which is most appropriate under the circumstances).

The **cephalic veins** run prominently down the front of each foreleg of an animal. They are a preferred route for direct injection of conscious, socialized, friendly dogs because the handler can easily extend the foreleg while providing gentle, humane restraint. The cephalic veins also are held tightly in place and tend not to "roll" or move sideways within the leg as easily as other veins do making them a preferred vein for many CETs.



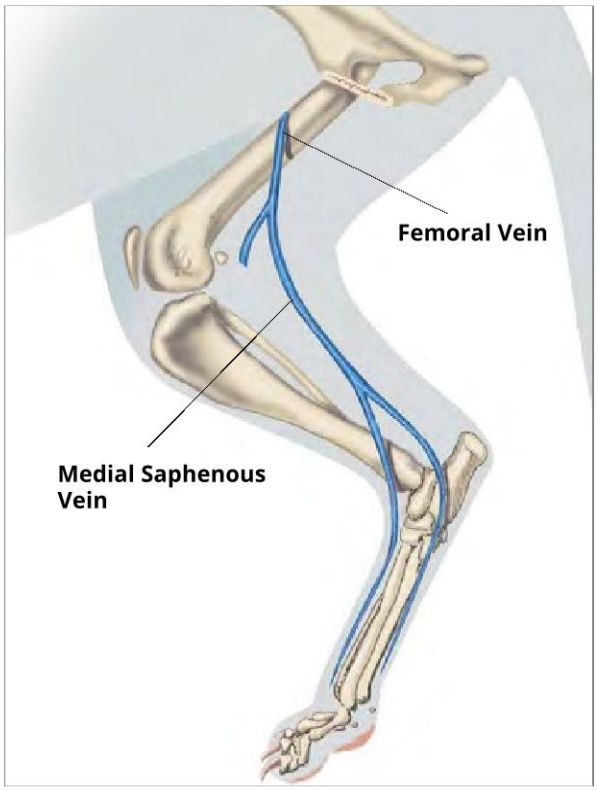
Cephalic vein of a dog

The **lateral saphenous** veins run down the outside of the rear leg of the animal and then cross diagonally across the leg just above the hock. The lateral saphenous veins of adult dogs tend to be fairly large and easy to find, making them the preferred choice for many CETs, provided they choose their specific injection location appropriately. Lateral saphenous veins must be injected away from the hock joint or they can roll, and they do not run directly from top to bottom of the leg as the cephalic veins do. The lateral saphenous vein can be used for direct injection of conscious dogs, if the animal is not unduly stressed by the gentle restraint of its rear leg. Cats, puppies and kittens, however, tend to have small lateral saphenous veins, making them a less attractive choice.



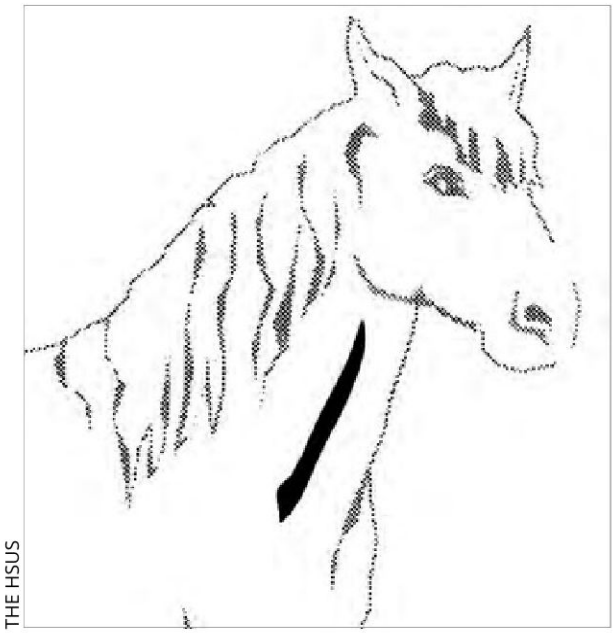
Lateral saphenous vein of a dog

The **medial saphenous veins** (aka femoral veins) run straight down the center of the inside of the animal's rear legs. They can be a good choice for unconscious cats, whose lateral saphenous veins may be too small to easily inject into.



View of the medial saphenous vein of a cat

The **jugular veins** run down each side of the neck of most mammals. Restraining a cat or a dog safely for jugular injection can be difficult, causing undue stress on both the animal and the handler. The jugular vein in an animal as small as a dog or cat is located very close to the trachea and carotid arteries, increasing the likelihood of improper injection. For these reasons, injection into the jugular vein of a conscious dog, cat or other small mammal should be avoided. For large animals like horses; however, the jugular veins are readily accessible and clearly evident, making injection fairly easy (the jugular vein can be up to 2 inches in diameter on a large horse). In these large animals it is often impractical or dangerous to attempt to inject veins in the leg, making jugular injection the safest option for the CET.



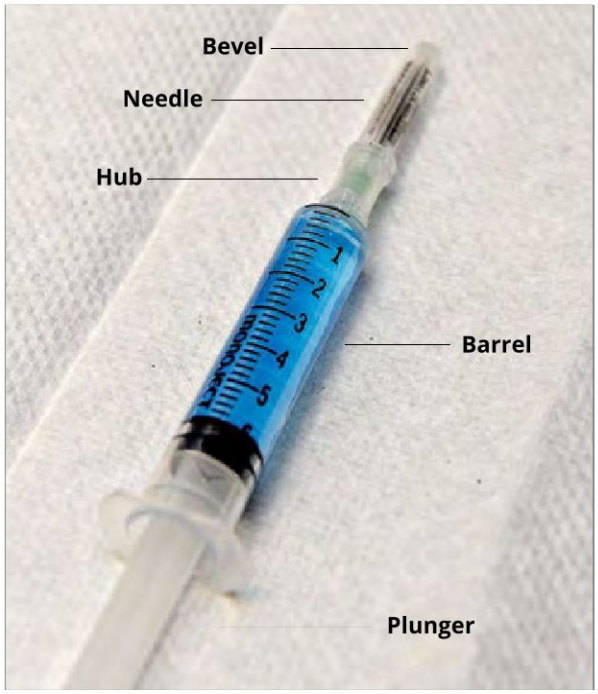
Location of the jugular veins in a horse

Administering IV Injections

NOTE: The following describes the correct procedure for injecting into a cephalic vein, but this basic technique is also generally applicable to injections into other veins as well. Specific information pertinent to injecting into the saphenous and jugular veins follows.

Readying the Syringe and Needle

Regardless of the method used to inject sodium pentobarbital, selection of the appropriate syringe and needle are the first step to ensuring success. The size of the syringe is dictated primarily by the volume of drug required. The larger the syringe the more unwieldy it is to use. CETs should always select the smallest syringe capable of handling the necessary dose of drug.



A syringe holding 6 ccs of euthanasia solution

The needle chosen will depend primarily on the size of the animal to be euthanized. Needles are available in several lengths and sizes, called gauges, according to the bore diameter of the needle. It may appear counterintuitive, but the smaller the diameter of the needle, the larger the gauge size. For example, a 25-gauge needle is smaller than a 22-gauge needle, which is smaller than an 18-gauge needle. Choosing a smaller needle generally produces less discomfort for the animal on injection. However, if a large volume of drug is required, a smaller needle may not be able to deliver the necessary volume of drug at an appropriate pace, or may fail completely and pop off the end of the syringe. Selecting the proper needle may seem to be a minor consideration, but it is a vital part of a good euthanasia technician's toolkit for making euthanasia as humane as possible.

Once the proper needle and syringe have been selected, the CET should insert a spare needle into the bottle and draw up the appropriate amount of sodium pentobarbital into the syringe, then attach the needle. Once that task is completed, both the CET and the handler should verify one last time that they have the right animal before them, that the appropriate paperwork authorizing euthanasia is in order, and that the animal has been scanned once more for a microchip or other identification. When all proper verifications have been made, the injection can proceed.

Locating the Proper Injection Site

Assuming the CET has decided to inject sodium pentobarbital into the cephalic vein (regardless of whether the animal is conscious or not), the handler should gently extend the animal's foreleg so that the front of the leg can be shaved. Shaving is not an absolute necessity, but it allows the CET to get a clearer view of the vein and increases the odds the injection will be successful on the first attempt. The CET should use clean and well-lubricated electric clippers (size 40 blades are recommended) to shave a sufficient area over the front of the animal's leg to allow access to the vein, clipping opposite the direction of hair growth (from paw to shoulder) to produce the closest shave. Care should also be taken to avoid "clipper burn." Abrasion of the skin can be caused by excessive heat of the clipper blades or poor blade positioning. Holding the clipper at the proper angle (typically flush against the skin), and applying light, consistent pressure, as well as proper lubrication of the blade will reduce "clipper burn."

Some CETs prefer not to shave, since the use of noisy clippers may add to an animal's stress. A higher degree of skill is necessary to locate the vein without first shaving the area. As an alternative, curved scissors may be used to eliminate excess fur, although care must be taken as the skin may "tent up" and be accidentally cut.

The CET may sprinkle alcohol on the area to help make the vein more visible—not only does the presence of alcohol flatten the hairs on the leg, but the evaporation process also helps to tighten the skin surface making the vein appear more prominent. Remember that if the fur has been shaved and the process has caused irritation, the alcohol application may result in a stinging sensation that results in discomfort for the animal.

In some animals, once the hair has been removed the vein will be easily visible as a long, bluish line running down the front of the leg. However, in most cases an additional step, known as "holding off the vein," must be taken to make the vein accessible for injection. Veins carry blood to the heart; in the case of the cephalic veins, blood is being pumped continuously up the leg from the paw towards the shoulder. When the flow of blood is constricted, the blood below the point of constriction backs up, increasing the pressure in the vein; this increase in blood pressure causes the vein to enlarge, making it much easier to see and feel (imagine a cheap garden hose – if the hose develops a kink that prevents water from continuing to move through, the pressure will cause the hose to appear to expand just below the point of the kink). This effect (referred to as "raising the vein") can be achieved either by having the handler "hold off" the vein manually or by applying a tourniquet or other mechanical means of blocking off the vein.

To hold off the cephalic vein, the handler grasps the leg from behind, "cupping" the animal's elbow in their palm, then wraps their thumb over the vein and applies firm, consistent pressure. This approach gives the handler a controlling grasp that obstructs the blood flow of the cephalic vein, causing it to swell so that it can be injected into more easily. It also helps to gently prevent the dog from retracting their leg away from the injection. The handler may roll their thumb and hand (along with the skin and vein it holds) slightly outward so that the vein is positioned directly on top of the leg bone, creating the ideal position for injection.



Readying for injection into the cephalic vein

If the handler requires both hands to gently restrain the animal or is otherwise unable to adequately hold off the vein, a commercially purchased tourniquet system may be used to achieve the same result. A Nye tourniquet consists of strong rubber cord that is placed around the animal's leg and then clamped with an attached friction grip. Alternatively, a hemostat can be used to clamp an elastic tube or band wrapped around the animal's leg. The tourniquet or hemostat should be placed just above the elbow and tightened firmly enough to cause the vein to rise for easy visibility. A tourniquet or hemostat can at times provide better constriction of a vein than simply a handler's thumb. It can be difficult for the CET to unclamp a mechanical device once the needle has been inserted, so most technicians prefer to rely on their partner for manual hold off.

If the CET is still having trouble viewing the vein after applying sufficient pressure to block the flow of blood and raise the vein, they can "pump" the leg by holding the upper part of the leg and moving the foot up and down several times. This is somewhat like shaking a dog's paw, except that only the foot and carpus (the dog's "wrist," or leg just above the foot) are moved. Pumping the leg increases the return of blood from the foot towards the heart and helps to further increase the size and appearance of the restricted vein. Rolling the leg slightly to one side or the other can sometimes change the visual angle enough to help the CET identify the vein. Finally, tapping the surface of the forelimb with the index finger can also help confirm the presence of the vein, which should have a more "springy" feeling than adjacent tissues.

Once the vein has been successfully located and raised for injection, the handler should continue to hold off the leg (or leave the tourniquet in place) until the CET indicates that the needle has been successfully inserted into the vein and the injection of sodium pentobarbital is ready to proceed.

IMPORTANT NOTE: The CET must be able to see and/or feel the vein prior to inserting the needle into the animal's limb. It is not acceptable practice to "fish around" for the vein (puncturing the skin then moving the needle around in a blind attempt to locate the vein), even if the CET is very experienced and knows where the vein is most likely to be located.

While veins are generally in the same place on every animal, there may be slight anatomical variations that must be accounted for from individual to individual. Some animals have veins that run perfectly vertical in the center of the foreleg. Others may have veins that sit slightly off center, that bend slightly to one side or the other, or that sit more or less deeply under the skin.

The CET should only attempt to pierce the skin with the needle if they are confident that the vein of that animal has been located and that there is a reasonable expectation of piercing the vein on the first try. If the CET has followed all steps listed above to try and locate the vein without success, they should either move on to another leg vein for IV injection or switch to IP injection if appropriate for the species and size of the animal.

Injection

The proper technique for injecting sodium pentobarbital into a vein is not the same as for administering vaccinations or other injections. The way the needle is directed, the angle at which it enters the skin; even the way the syringe is physically picked up and held, are different for administration of an IV injection. CETs must be aware of and comfortable with these differences. When administering a vaccination, the CET typically holds the syringe in between the index and middle fingers and places the thumb on the plunger, so the hand effectively surrounds the syringe. The orientation of the bevel (the hole from which the liquid leaves the needle) of the needle isn't critically important when administering a vaccination, nor is the exact angle at which the injection is made. When administering IV injections; however, care must be taken to ensure that the bevel of the needle is pointed up so that the sharpest point of the needle is the first to touch and enter the skin, ensuring a clean puncture. The angle of the needle is shallow enough to allow it to fully enter the vein without piercing the far side. The CET should pick up the syringe as though it were glued to a table surface. Ideal finger placement is for the thumb to sit on one side of the syringe and for the first and second fingertips to sit on the other side, on the barrel away from the needle end of the syringe (so there is room for the technician's other hand to properly stabilize the needle, as discussed below), with no part of the hand lying underneath the syringe. This ensures that the syringe can have fairly close contact with the skin of the animal. It also allows the technician to control the angle of the needle most effectively.

The hand not holding the syringe should be used to stabilize both the leg of the animal and the vein itself. Ideally, the CET should wrap their hand under the animal's leg and cradle the vein between the thumb and fingers; this technique has the added benefit of creating a kind of channel to help guide the needle into the proper location in the center of the vein. Alternatively, the CET can wrap their fingers around the back of the animal's leg and lay the thumb flat along the vein from thumbnail to palm, applying gentle steady pressure so that the vein does not roll away from the needle.



Inserting needle into the cephalic vein

Once the handler has a firm but gentle grasp on the animal, the vein has been definitively located and stabilized, and the CET has the syringe at the ready (beveled edge facing up), injection can begin. The first injection attempt should be made into the vein in the center of the shaved area (typically just above the carpus, or wrist joint). The skin of most dogs and cats is thin enough that it takes only a small amount of pressure to make the initial puncture; the CET will feel brief resistance, then a smooth insertion under the skin. Age, gender, and the medical condition of the animal can make the skin a bit more difficult to pierce.

One of the most difficult aspects of successful IV injection is developing an appreciation for not just the proper location for insertion but the angle at which the needle should be inserted. IV injection requires that the needle puncture the skin and fully enter the vein so that the drug can be injected directly into the blood stream and carried swiftly to the heart (commonly referred to as "hitting the vein").

If the initial approach is at too shallow an angle, the needle may puncture the skin but may not actually enter the vein, or the needle may bounce off the top of the vein and roll the vein away. If the injection is attempted, the drug will simply pool between the skin and the vein. Alternatively, if the approach is at too steep an angle, the needle is likely to pass through the vein and out the other side (given that most veins are just a few millimeters wide), again causing any drug injected to miss the bloodstream. Generally, entering the skin at an angle less than 30 degrees (the angle will be less with a smaller animal) is likely to produce the greatest success. However, because all animals are individuals there is no guaranteed perfect angle, and the best way for a CET to maximize success is through practice and experience.



Injection into the cephalic vein of an unconscious dog

It can be difficult for the inexperienced CET to know when the needle has successfully entered the vein. Although not always present, there is frequently a "flash" of bright red blood that appears in the hub of the needle (the plastic part of the needle that attaches to the syringe) when the vein is pierced. This may be accompanied by a very slight popping feeling as the needle pierces the vein wall and enters the blood stream, after which it should meet little resistance unless it is inserted so far that it pierces the other side. Feeling the vein is one of the most difficult skills for the new CET, but with patience and practice it is one that can be readily mastered.

Once the vein has been successfully entered, the CET must continue to insert the needle until a sufficient portion of its length is inside the vein. If only the tip or a very small portion of the needle is inserted, the needle is likely to be knocked out of the vein once pressure is applied to the plunger to inject the drug. Care must be taken to ensure that the needle is not thrust so far in that it pierces the far wall of the vein. Practice and experience are the best teachers.

Because the proper placement of the needle inside the vein is so critical, once it has been successfully achieved the CET must secure the syringe in place before any drug is injected. This is important not just because the pressure of injection could cause the needle to move, but because the animal may at any point jerk their leg away, altering placement of the needle. If the syringe is clamped securely to the leg, the CET can usually continue the injection even though the leg is moving. Alternatively, the CET may wait a few seconds until movement has stopped and then continue.

Typically, the CET secures the syringe by taking the thumb that was formerly supporting the vein for initial injection and clamping it down over the syringe, securing it firmly between the thumb and the leg of the animal. Placement of the thumb is important. It must be far enough back to secure the body of the syringe, rather than the needle, and it must not block the technician's view of the hub (it is necessary for the CET to look for blood in the hub when the needle is aspirated). Alternatively, the CET may secure the syringe by clamping it between the thumb and fingers of the hand holding the leg. At first these movements may seem awkward, because they mean loosening the grip on the animal's leg momentarily and finding just the right spot to hold the syringe securely in place. With practice, however, it becomes a quick, smooth motion that secures the syringe firmly without any shift in needle location.

Verifying that the Needle Is in the Vein (Aspirating Blood)

Once the syringe has been secured to the leg, the CET must confirm that the needle is properly in the vein. To do this, aspirate (draw back) blood into the syringe. When the plunger of a syringe is pulled back, it sucks in whatever material the needle is exposed to. If the needle is immersed in water, for example, pulling back the plunger (aspirating) will draw water up into the syringe. If the needle is immersed in blood, as it should be if it is properly inserted into a vein, pulling back on the plunger will draw blood into the syringe. This is the most definitive sign that the needle is properly placed for injection of sodium pentobarbital. If pulling back on the plunger produces either no blood at all or just a slight flash of blood, the needle is not actually in the vein and it must be repositioned before any drug is injected.

IMPORTANT NOTE: When aspirating, pull back on the plunger gently; pulling back too aggressively can draw the wall of the vein into the needle tip ("collapsing" the vein), blocking the needle.

To reposition the needle, it is often not necessary to remove it fully from underneath the skin. In fact, it is preferable to simply reposition the needle under the skin to avoid causing the animal pain by reinjection. The CET should use their senses to determine whether the needle is sitting above, below, to the right or to the left of the vein and adjust position accordingly. Once the needle has been repositioned, it should once again be secured and aspiration attempted. It may be necessary to move the needle several times before successful aspiration of blood confirms that it has been properly placed. This happens to even the best and most experienced technicians. The important thing is to not become frustrated or upset, since humans' moods can easily be read by the animal—simply take a breath, regroup, and try again.

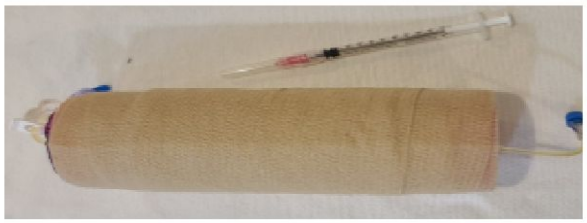
IMPORTANT NOTE: If it appears from all indications that the needle is in the vein but nevertheless no blood can be aspirated, the needle may be clogged. Dirt from the animal's skin, skin tissue, blood from a prior insertion attempt, or a hair particle may be caught in the shaft, blocking the delivery of the drug. The only way to confirm this is to withdraw the needle, aim it away from any animals or people, and gently attempt to push a small amount of solution out of the syringe. If nothing comes out, the needle is clogged and should be discarded. Use a new needle to attempt another injection.

If it is necessary to remove the needle from the leg, remove the pressure being used to raise the vein (loosen the tourniquet or relinquish the hold on the vein). Apply gentle pressure to the puncture site to try to avoid the formation of a hematoma or swelling created by blood leaking from the pierced vein.

The second injection attempt should be made either slightly above or slightly below the initial puncture site. If the animal begins to resist, let it relax for a moment by loosening (but not releasing) the restraint.

IMPORTANT NOTE: Every time the CET pierces the skin, the needle becomes dull, and can cause the animal pain. If the animal is conscious and you have missed the vein, at a minimum you should replace the needle.

If the animal is unconscious and the vein continues to be missed, the CET can simply move on to another leg. If the CET is still not having success in hitting the vein, consider passing the syringe to another CET. Every CET has gone through the experience of being seemingly completely unable to hit a vein, only to have their partner hit the vein on their first try. While understandably frustrating, it is important to shake this off and move on with the work, since everyone has a bad day from time to time. One final tip on hitting veins: Those just learning the art of intravenous injection tend to be very cautious, and rightly so. Their tendency is to hesitate and advance the needle very slowly. However, a slow moving needle is more apt to push the vein off to one side, rather than pierce it, and piercing the skin slowly is more painful than moving through the skin deftly. Practice will help the inexperienced CET become more confident in their skills and slide the needle into the vein with a deliberate, yet gentle motion. Consider working with models like a segment of pool noodle with an IV extension line covered with an adhesive wrap. The line can be filled with food colored water to simulate blood.



Homemade IV injection model

Injecting the Drug

Once blood is clearly aspirated into the syringe, allowing the CET to confirm that the needle is properly located in the vein, the sodium pentobarbital can be injected. The CET should signal the handler to remove the pressure from the vein (or release the tourniquet) so that full blood flow to the heart is restored. If an injection is attempted before pressure is released, the leg will begin to swell because of the backup.

When administering vaccinations or injecting pre-euthanasia drugs, best practice is to inject the drug slowly, so as to limit stinging; by contrast, sodium pentobarbital should generally be administered quickly, so that the maximum amount of drug possible is carried to the heart and then the brain at one time. The effect of getting a large quantity of drug to reach the target at one time is called a bolus effect. Injecting the drug too slowly may cause the animal to move slowly between Stages I and IV. If the animal is conscious adverse reactions may be seen (howling, uncoordinated movement, anxiousness, etc.) before losing consciousness.

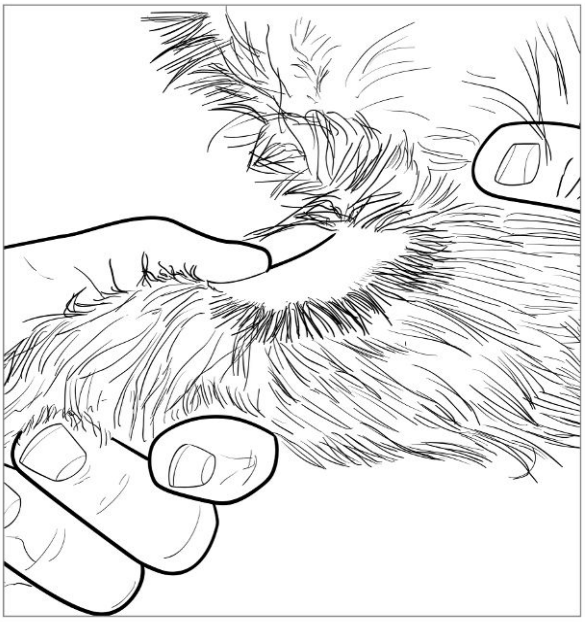
IMPORTANT NOTE: Drugs that combine sodium pentobarbital with phenytoin sodium should be administered slowly, since the presence of phenytoin sodium is sufficient to avoid the need for bolus administration.

When injecting drugs, care must be taken to ensure that the pressure on the syringe is not so great that the needle either moves out of the vein or pops off the end of the syringe. On conscious animals, when the injection process is done correctly, the animal should begin to lose consciousness and collapse within 3–5 seconds after the first milliliter of sodium pentobarbital is introduced into the vein. The CET should continue to inject the sodium pentobarbital until the syringe is empty, and the handler should continue to gently restrain the animal until it has fully lost consciousness. If the injection is successful there will be no visible change to the leg during or after injection. If a bulge appears, the vein wall has been compromised, drug is escaping and injection should cease immediately (this is commonly referred to as having "blown" the vein).

Removing the Needle

If the animal was conscious when direct IV injection was performed, they will typically lose consciousness and begin to collapse before the injection is completed. The handler should take care to gently lower the animal to the table or floor once they are unable to stand on their own, ensuring that the syringe remains in place until fully withdrawn by the CET, in addition to showing respect for the animal. When the animal is completely unconscious and is resting fully on the table or floor, the CET may remove the needle from the vein by pulling it out slowly. Slight pressure should be placed on the injection site to prevent blood from seeping from the puncture.

IMPORTANT NOTE: Verifying death is a required next step. The euthanasia process is never finished until verification of death has occurred.



Light pressure on the puncture after injection will prevent bleeding

Special Considerations for Injecting into the Saphenous Vein

The procedure for injecting into the saphenous vein is generally the same as that for the cephalic vein, except for how the vein is held off and how the needle is inserted.

Holding Off the Saphenous Vein

To hold off the lateral saphenous vein, the handler usually places their hand around the leg just above the stifle (knee), so that the thumb is on the back side of the leg and the fingers on the front surface of the leg. The vein is then held off by gently but firmly squeezing the leg and the vein between the thumb and fingers; when properly performed, this pressure will cause the leg to extend. The primary goal is to get sufficient pressure over the saphenous vein as it runs down the rear leg to both raise it and stabilize it for injection. For the medial saphenous vein, the handler may either hold off in a similar fashion; only the leg is reversed. Alternatively, the handler may apply pressure with the outer edge of the palm, usually while holding the animal's leg or tail.

IMPORTANT NOTE: The closer the CET gets to the animal's joint the higher the likelihood that the vein will roll. Injecting higher up and away from the joint proves much easier. A commercial tourniquet does not hold its position well when used above the joint, so a partner able to manually hold off the saphenous vein is necessary.

Injecting the Drug

Because the saphenous vein is much freer to move under the skin than the cephalic vein, the needle must be inserted with a quick puncture, threading into the vein quickly and stabilizing its movement. If the CET attempts to place the needle over the vein and slowly insert it, particularly if the injection site is too close to the joint, the saphenous vein will roll out from under the needle and off to the side. When injecting into the saphenous vein it is important for the handler and CET to communicate effectively, since the more pressure is applied to stabilize the vein the more difficult it can be for the technician to feel.

Once the needle is in the vein, the same procedure should be carried out as for injection into the cephalic vein. The syringe must be secured in place and aspirated, the pressure on the vein released, and the drug injected.

IMPORTANT NOTE: Securing the syringe to the leg may be slightly more awkward than with the cephalic vein, as the syringe and rear leg will not be aligned in the same direction.

Special Considerations for Injecting Into the Jugular Vein

While it is technically possible to use the jugular vein for euthanasia of cats and dogs, it is not recommended unless the animal is unconcious. However, for livestock, equines and other large mammals the jugular veins are typically preferred because they are very large and readily accessible, and can handle the large volumes of sodium pentobarbital required for euthanasia. Trying to inject into the leg of a conscious equine or other large animal poses grave safety risks for the CET and handlers.

IMPORTANT NOTE: CETs should not attempt euthanasia on large animals unless they have experience and proper certifications. Large animals can be dangerous to work around and pose special risks even after injection. Even CETs with extensive small animal euthanasia experience should defer to the expertise of a large animal veterinarian.

Holding Off the Jugular Vein

To hold off the jugular vein, one or more fingers should be pressed against the vein below the injection site in the jugular furrow (blood in the jugular vein runs down the neck towards the animal's heart). Since a tourniquet or other mechanical means cannot be used to hold off the jugular vein, the technician must become proficient at holding the vein off themselves, placing the fingertips flat across the vein to provide the maximum area of pressure.

Problems with IV Injection (Commonly referred to as "Blowing the Vein")

Proper IV injection involves inserting the needle inside the vein and ensuring that 100% of the drug injected enters the bloodstream and flows to the heart. If the needle pierces the vein wall (either because the initial needle insertion was imprecise or because movement by the animal or CET pushed the needle out of the vein) or misses the vein entirely, and drug ends up injected outside the normal flow of blood, the drug will pool under the skin and make the area swell up (this is clinically referred to as "extravascular injection," injection of drug outside the vein). This is what CETs commonly refer to as "blowing the vein," and it can happen to even the most skilled CETs.

When it occurs, the CET should not panic but should take steps to correct the problem and ensure that the euthanasia process continues as quickly and humanely as possible. If the animal is conscious, the animal may perceive pain with the extravascular injection.

If the CET believes that the vein has been blown (as evidenced by swelling indicating that the drug is outside the vein, or by a pain reaction from the animal), they should stop injecting immediately, withdraw the needle, and apply pressure to the injection site to stop the flow of blood. There is no point in continuing to inject additional drug, since it will not be properly carried by the bloodstream to the heart. If the animal is still calm and tractable, or if the animal is unconscious, the CET can simply attempt a second injection. However, if the animal is either reacting in pain or becomes caught in the Excitement stage of anesthesia, it is neither safe nor practical to continue trying to administer sodium pentobarbital by IV injection. The animal will not be sufficiently manageable to safely administer the drug. In such cases, a pre-euthanasia drug should quickly be administered into the large muscle mass of the leg or back so that the animal is rendered unconscious as quickly as possible and humane injection of sodium pentobarbital can proceed.

IV Dosage of Sodium Pentobarbital

For IV injections of dogs and cats, regardless of the vein that is selected, the standard dosage of sodium pentobarbital in commercial formulations is 1 ml per 10 lbs of body weight. That means when IV injection is used, a cat weighing 10 lb should receive 1 ml of sodium pentobarbital, and a 100 lb dog should receive 10 ml. A simple method to calculate the appropriate IV dosage of sodium pentobarbital is to divide the animal's body weight (in pounds) by 10, which equals the volume of drug in milliliters to be administered. CETs can help minimize the chances of recordkeeping errors by rounding up (never down!) to the nearest ml. Entering fractions into a euthanasia log book is an invitation for mathematical errors. The label dose of 1 ml/10 lbs is almost three times the lethal dose of the drug. Rounding up and administering slightly even more drug than technically needed is therefore perfectly acceptable (it is never acceptable to use less than the label dose). Therefore, for an 18 lb animal, even though the accurate label dose is 1.8 ml, administration of 2 ml is appropriate.

When animals are circulatory compromised (in shock), double the dose of euthanasia solution used. The reduced blood pressure impacts the ability of the veins to pump the drug to the heart so more euthanasia solution must be used. The increase in cost is minimal and should not be considered when the technician decides to double the dose. It is important that the amount used is logged appropriately. In the case of the 18 lb animal, if they were in shock, the dose would be doubled to 3.6 ml and rounded up to 4 ml.

IV—Intravenous
(injection of sodium pentobarbital into a vein)

Species recommended: dogs, calm and friendly cats

Dose: 39 mg/pound (usually 1 ml/10 pounds)

Circulatory compromised: 78 mg/pound (2 ml/10 pounds)

Injection speed: rapid (1-2 ml/second) and consistent with good technique

Dog veins: cephalic, lateral saphenous

Cat veins: cephalic, medial saphenous (femoral)

Syringe retracts: small volume (flash) of blood

Time to loss of consciousness: ~5 seconds

Syringe retracts: small volume (flash) of blood

Time to deep anesthesia: ~10 seconds

Time to cessation of respiration: ~20 seconds

Time to deep anesthesia: ~10 seconds

Time to cessation of heartbeat (death): ~40 seconds

Time to cardiac standstill (no fibrillation): ~2–5 minutes

Intraperitoneal (IP) Injection
(Injection of Sodium Pentobarbital into the Abdominal Cavity)

Intraperitoneal (IP) injection involves the injection of sodium pentobarbital directly into the animal's abdominal cavity, the space in the abdomen surrounding most of the internal organs. While at first glance this method might appear to be painful, and therefore inappropriate as a method of euthanasia, when performed properly it is thought to be painless for the animal

With IP injection, the needle is inserted into the narrow band of connective tissue that runs vertically along the center of the abdomen called the linea alba (imagine the center line of the "six pack" on a person with very well-defined abdominal muscles). The linea alba is a tendon and tendons have very few nerve endings or blood vessels. Because there are no nerve endings or blood vessels along this line, there is no pain or sensitivity upon insertion of the needle or during injection.

The IP injection is a good option for kittens, puppies, birds, reptiles, small mammals and small wildlife, whose veins are difficult to locate. IP is not a good option for pregnant animals, or for adult dogs and puppies over five weeks of age because they are more likely to experience a panic/excitement response, and because IP requires the injection of three times the quantity of drug that IV does.

IMPORTANT NOTE: In species without a diaphragm the injection into the "abdominal cavity" is called an intracoelomic injection (ICo).

When sodium pentobarbital is injected into the abdominal cavity it begins to disperse over the large surface area of the intestines and internal organs. After several minutes, the drug starts being absorbed into the bloodstream and slowly travels to the brain. This process of absorption makes IP a slower process than IV, where the drug is injected directly into the bloodstream. The time period between injection and death is typically less than 10 minutes, and it is vital that during this time the animal be placed in a dark, quiet, confined area (such as a carrier covered with a thick towel or blanket) while the drug takes effect.

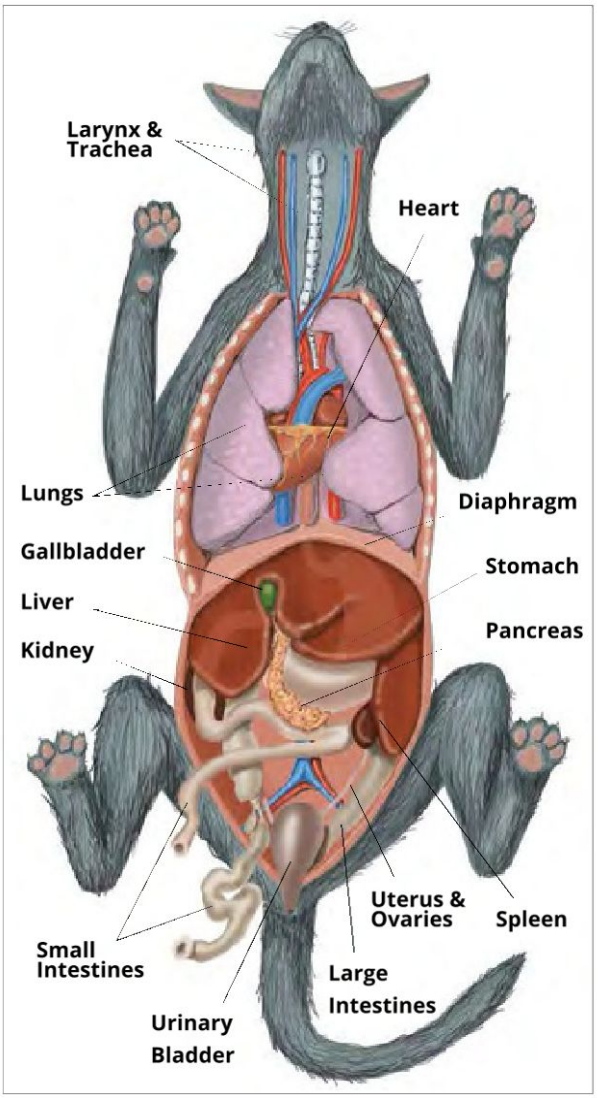
While the slower time to effect and triple dosages can be considered disadvantages of IP administration, they must be weighed against the stress that would be caused to the animal if they were restrained for an IV injection and the inherent difficulties trying to successfully insert a needle into very tiny veins. For well-socialized cats, kittens and other small mammals, IP can in many cases be the more humane and effective method of administering sodium pentobarbital.

Administering IP Injection

To administer an IP injection, the animal must be gently lifted so that its abdomen is accessible to the euthanasia technician for injection of sodium pentobarbital. This can be achieved with a well-socialized adult cat, for example, by simply gathering the cat's front legs and lifting them slightly off the exam table; the drug can then be injected without the cat even realizing the procedure is happening.

Once the belly is accessible, injection should be made into the animal's ventral midline. The ventral midline injection site is located midway down the abdomen, just below the umbilicus (belly button). The xiphoid, a cartilaginous protrusion at the base of the sternum (the breast bone), makes for a good landmark in locating this injection site. Look for the xiphoid (the end of the sternum), and draw an imaginary vertical line down the animal's abdomen from that point (remember, there are no nerve endings or blood vessels along this imaginary vertical line, called the linea alba).

Next, look for the animal's hip joints, and draw an imaginary horizontal line between them. The intersection of the imaginary horizontal and vertical lines will indicate the point on the animal's midline just below the belly button where it is safe to insert the needle for an IP injection. When the CET successfully injects into the ventral midline the drug will be properly injected into the peritoneal cavity, and the injection will be completely painless.



View of a cat's internal organs, as seen from above

Injecting into the midline does not require quite as much accuracy as injecting into a vein, it is still critical to properly locate the injection site. To avoid pain when performing an IP injection, care should be taken not to inject euthanasia solution into an organ like the liver, spleen or kidneys. *The AVMA Guidelines for the Euthanasia of Animals*: *2020 Edition* clearly states that an animal must be unconscious before performing an injection into an organ.

The lower part of the abdomen should be avoided because if the drugs are injected into the bladder. they may simply be excreted through the urine before being absorbed.

Injection into any other area of the abdomen aside from the ventral midline will be painful, because there is a high concentration of nerves in the abdominal muscles. Remember, injections are given into the linea alba, which is a tendon, and has very few nerves. The lack of nerves in tendons makes the perception of pain minimal.

It is not necessary to shave the abdominal area prior to IP injection. Simply insert the needle straight into the ventral midline of the abdomen at a 90 degree angle to the body (as opposed to the much shallower angle used when injecting into a vein). The smallest gauge needle available is recommended; typically, a 22-; 23-; or 25-gauge, three-quarter-inch to one-inch needle is used.

Upon aspirating (pulling back) the syringe's plunger, a vacuum with no blood or other bodily fluid entering the syringe should be observed, indicating that the needle has been successfully inserted into the abdominal cavity. If there is fluid or other material in the syringe, the needle should be withdrawn and repositioned, because it may be mistakenly located in the spleen, bladder or other organ. If the needle appears to be located properly, meaning no blood, urine or other bodily fluid appears that would indicate it has been improperly placed in an organ, inject the drug at a steady rate.

IMPORTANT NOTE: While the peritoneal cavity is normally empty, creating a vacuum on aspiration, there are situations in which the needle is properly in the cavity but fluids are nevertheless aspirated. Blood may be present because of internal injuries, or diseases like feline infectious peritonitis (FIP) could cause fluids to exist there. An experienced CET will be able to tell whether fluids aspirated into the syringe indicate that the needle has been improperly inserted or fluids have invaded the cavity; if in doubt, they should either reposition the needle and try again, or opt for an alternate method of administering sodium pentobarbital.

Because the IP route does not induce immediate unconsciousness, all animals that have been given an IP injection should be immediately placed in a cage or kennel with soft bedding where they can remain undisturbed until they have lost consciousness. The cage or kennel should be covered with a towel or blanket, or the lights in the room should be dimmed, and any noise minimized to avoid any undue stimulation of the animal as the drug takes effect. Although most animals should be placed alone in a cage or kennel after IP injection, littermates can be placed in together to provide them more comfort and security.

IMPORTANT NOTE: If a mother and litter are to be euthanized, the mother should be euthanized before the litter to help reduce her stress to the greatest extent possible.

As an animal passes through the early stages of anesthesia after IP injection, several signs may be noted. One of the first is a characteristic tongue licking, typically seen approximately 2 minutes following the IP injection. Thereafter, the animal typically loses coordination and may fall over or begin to flail. The animal is not experiencing pain at this point, but is still capable of reflexively biting if startled, making this a potentially dangerous time for a CET or handler. Minimizing environmental stimuli, such as noise and light, is especially important during this stage. If the animal has not begun to show signs of moving through the stages of anesthesia towards unconsciousness and death within 10 minutes after IP injection, it is possible that the drug was mistakenly injected into (and subsequently expelled from) the bladder, or that its absorption has been otherwise impeded, usually by absorption into fat. The animal should be injected again with additional drugs, either by IP or IV injection. Even after the animal appears to be unconscious (lying still, no blink or toe reflexes), it may take another 10-15 minutes for clinical death to occur.

When performing an IP injection, if 10 minutes have elapsed and there are still signs of life, the CET should consider giving an additional injection of sodium pentobarbital as an IC injection. The CET must confirm the animal is unconscious prior to giving an IC injection.

IMPORTANT NOTE: Never assume that an unconscious animal is dead! Always take proactive steps to verify death. If the animal is not deceased, then inject a full dose of sodium pentobarbital IV or IC. When giving an IC injection, confirm the animal is unconscious first.



Proper hold and injection site for IP injection of a cat

IP Dosage of Sodium Pentobarbital

The standard dosage for IP injections is 3 ml per 10 lbs of body weight, or triple the dosage used for an IV injection (the larger dose is required because the drug must be absorbed into the bloodstream before beginning its trip to the brain). A minimum dosage of 1 ml of sodium pentobarbital should be used on any animal under 3 lbs (except for neonates or very small animals like mice, etc., whose bodies may not be large enough to absorb a full ml of drug).

IMPORTANT NOTE: Only inject sodium pentobarbital solutions via the IP route that are labeled for IP delivery.

IP - Intraperitoneal

(injection of sodium pentobarbital into the abdominal cavity - needle passes through the skin, muscle wall and peritoneum)

Species recommended: conscious, calm and friendly cats; conscious puppies under 5 weeks; conscious or unconscious small rodents

Dose: 117 mg/lb (usually 3 ml/10 pounds)

Circulatory compromised: not usually recommended

Injection speed: slow (0.5-1 ml/second) and consistent with good technique

Needle insertion point: ventral, midline, ~2" below (caudal to) umbilicus

Needle angle/depth: right angle to the skin/~3/4 inch

Syringe retracts: suction (no fluid, no air)

Time to loss of consciousness: ~2 minutes

Time to deep anesthesia: 3-4 minutes

Time to cessation of respiration: ~6 minutes

Time to cessation of heartbeat (death): ~8 minutes

Time to cardiac standstill (no fibrillation): ~10 minutes

Intracardiac Injection

(injection of sodium pentobarbital directly into the heart)

An intracardiac (IC) injection involves the injection of sodium pentobarbital directly into the heart, where it is quickly transported to the brain. Injection into a conscious animal's heart is excruciatingly painful, even if the CET can locate the heart chamber on the first attempt. An IC injection must never be administered to an animal unless the CET has confirmed that the animal is fully unconscious. Many states and municipalities have laws dictating that animals must be fully unconscious before an IC injection is performed. Assuming that the CET has taken care to ensure that the animal is unconscious, the IC method can be the most efficient method of administration of sodium pentobarbital, particularly if: a) the animal's veins have been compromised due to illness or injury; b) the animal's circulatory system is too compromised to transport the drug from a vein to the brain; or c) sodium pentobarbital has already been administered to the animal through IV or IP injection but has not effectively resulted in death.

Administering IC Injection

An animal must be unconscious to perform an IC injection. This means the CET must always verify that the animal is fully unconscious before attempting IC injection (animals can be rendered unconscious either deliberately, through administration of a pre-euthanasia drug, or unintentionally, due to illness or injury). An animal can be considered fully unconscious if he or she has neither a palpebral (blink) reflex nor a toe pinch reflex. To check for a blink reflex, the CET should gently touch the inside corner of the eyelid. Look for a blink reflex first. Remember that the lack of a blink reflex is not sufficient to state an animal is unconscious.

IMPORTANT NOTE: The CET must check for a toe pinch reflex.

To check for a toe pinch reflex, which assesses whether the animal is still able to withdraw from deep pain, the CET should pinch firmly on the soft skin (or webbing) between the toes of a rear leg. If the animal does not respond by reflexively pulling their leg back and away from the pain they are unconscious, and IC injection can be administered. If the animal still has either a blink or a toe pinch reflex, give the animal more time for the drugs to take effect or administer additional pre-euthanasia drugs.

IC—Intracardiac

(injection of sodium pentobarbital into one of the four heart chambers)

Unconscious animals only

Species recommended: all

Dose: 39 mg/lb (usually 1 ml/10 pounds)

Circulatory compromised: 39 mg/lb (usually 1ml/10 lbs)

Needle insertion point: right or left side, 4th intercostal space, or sternally in cats

Syringe retracts: large volume (fill) of blood

Injection speed: slow (0.5-1ml/second) and consistent with good technique

Time to cessation of heartbeat (death): 5-10 seconds

Time to cardiac standstill (no fibrillation): ~2-5 minutes

Once it has been confirmed that the animal is unconscious, IC injection can proceed. Locating the chambers of the heart for proper IC injection is not always easy, even for an experienced euthanasia technician. On most unconscious animals, the heartbeat can be felt on the skin surface using the fingers, or heard with a stethoscope. Injection should be made at the point where the heart is heard or felt most prominently, although the exact position will vary according to the animal's species, age, size, and weight. If the heart cannot be easily heard or felt, a good reference point for the correct injection site is the point where the animal's elbow aligns with the body: while the animal is lying on their side, bend the front leg back slightly towards the rib cage so that the shoulder is at a 45 degree angle; the proper injection site should be directly behind the animal's elbow. Alternatively, the CET can count the animal's ribs and inject into lower side in the 3rd, 4th or 5th "intercostal" spaces (the spaces between the ribs). The best technique for identifying the proper location is to practice on a live dog. As the dog is laying down, count back the spaces between the ribs beginning at his front leg. Feel for a strong heartbeat in the 3rd, 4th, and 5th spaces.

Because the heart is located much further below the skin surface than a vein, it is typically necessary to use a much longer needle for IC injection than is used for IV or IP injections. A needle two inches in length may be required for obese or deep-chested animals (the CET need not worry about pain a large bore needle may cause because they will have already confirmed that the animal is unconscious and unable to feel pain).

IMPORTANT NOTE: Clipping or shaving is not necessary for IC injections because the heart's location cannot be seen from any indicators on the skin.

When performing an IC injection, the needle should be inserted straight into the chest cavity at a 90 degree angle, as opposed to the much shallower angle required for IV injection. The CET should ensure that the needle is inserted between ribs (if the needle hits a rib the CET will feel resistance, and should reposition). The CET should then aspirate (pull back on the plunger) to ensure that the needle is in one of the chambers of the heart, rather than in the muscle of the heart or elsewhere. If the needle has been properly inserted into a chamber of the heart, a rapid, strong flow of blood will be observed when the plunger is pulled back, and the syringe will rapidly fill with blood. If blood is not easily aspirated, or if only a quick flash of bright red blood is observed, the needle may be in the heart muscle, or may have missed the heart entirely. The needle should be redirected until a strong flow of blood is easily aspirated, indicating it is correctly located one of the chambers of the heart.

IMPORTANT NOTE: Injection into the heart muscle, rather than a chamber, is not considered to be proper IC injection. That is an (IM) injection, which is not considered to be an acceptable route of administration of sodium pentobarbital.

Therefore, just watching for movement of the needle is not sufficient, since injection into the heart muscle will cause the needle to move. The CET must observe the strong, rapid flow of blood into the needle.

Once the CET has verified that the needle is properly in a chamber of the heart, sodium pentobarbital can be injected. To facilitate verification of death after an IC injection is completed, the needle should be left in place until the heart has been observed to stop beating.

SPECIAL NOTE: If any movement of the syringe is noted, immediately give another full dose of euthanasia solution.



The proper location for intracardiac injection or heart stick

IC Dosage of Sodium Pentobarbital

The correct dosage for IC injections is the same as for IV injections, 1 ml for each 10 lbs. of body weight. Circulatory compromised animals do not require an increase in the dose of sodium pentobarbital. The dose remains 1 ml for each 10 lbs.

CHAPTER 9

Verifying Death—The Most Critical Step in the Euthanasia Process

The euthanasia process is not complete until death has been verified. Dramatic stories about euthanized animals "waking up" after euthanasia are not modern-day miracles, but examples of grievous failures in the euthanasia process. The animal was not administered an appropriate amount of drug sufficient to depress essential brain functions, and so never moved from Stage III, Anesthesia, into Stage IV, Overdose. In effect, the animal was never actually euthanized at all. If the technician had properly attempted to verify death they would have discovered that the animal's basic life functions had not been completely suppressed, and would have recognized that administration of additional sodium pentobarbital was necessary to achieve euthanasia.

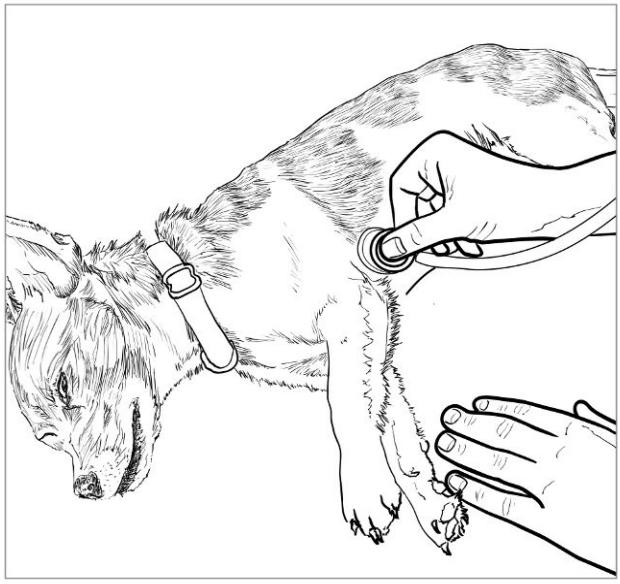
Unless proper verification steps are taken, it is surprisingly easy to mistake an animal for dead. Sodium pentobarbital is a potent drug that puts animals into a deep anesthetic plane which can fool even seasoned veterans. The animal can appear lifeless, without any evidence of breathing or heartbeat, yet still retain minimal life sustaining functions. They may survive in this state until the effects of the drug wear off, sometimes many hours later, and then will appear to "revive." Because incidents such as this are possible, it is essential to develop a protocol for the verification of death and ensure that it is followed for every animal without exception.

It is not an exaggeration to say that **the implications of failure to verify death are monumental**. The trauma for the animal who "wakes up" in a landfill, freezer, or worse, is unimaginable, and the guilt experienced by the euthanasia technician responsible can be overwhelming. Moreover, the media reporting of such an incident can do lasting damage to the reputation of the shelter, and the loss of the public's trust can be permanent. For all these reasons, verification of death can be viewed as the most crucial aspect of the euthanasia process, and the CET must take responsibility for checking each animal and ensuring that death has occurred. If there is any doubt, the animal should be injected again with sodium pentobarbital and rechecked until death is definitively confirmed. Only at that point should proper disposal of the animal's body be made, in compliance with policy and with state and local laws.

Verifying Death

Verifying death is a critical step in the euthanasia process and a CET must be proficient at confirmation of death. *The ASV Guidelines for the Standards of Care in Animal Shelters* says that death must be confirmed by multiple verification methods. Please see the table at the end of this chapter.

- **Lack of consciousness is confirmed** first by the absence of reflexes (blink and toe-pinch reflex).
- **Cessation of respiration or lack of breathing is confirmed** by watching for chest movement and listening for lung sounds.
- **Assessment of the mucous membranes** for pale (lack of blood pressure and tissue profusion) or cyanosis (blue gums) due to lack of oxygen is frequently considered an additional indication of death.
- **Death cannot be confirmed until cardiac standstill is verified** by using multiple routes (look, listen and feel). The CET must watch the chest for a heartbeat, feel for pulses and the chest wall over the heart for a heartbeat and finally listen for a heartbeat with a good quality stethoscope.
- **In some instances, final confirmation of death may require an intracardiac insertion of a needle and looking for movement of the syringe.** This method can be used when the CET is uncertain of death and is used only after completing all other steps for confirmation of death.



A stethoscope is one means of verifying death

When an animal "wakes up" from euthanasia it is typically because the CET has misinterpreted two signs; the appearance of lifelessness and lack of breathing; as proof of death. It is critical for CETs to understand why these two signs can be deceptive, and why affirmative steps must be taken to definitively declare an animal dead.

As we know from the previous discussion of the stages of anesthesia, sodium pentobarbital puts animals into such a deep plane of surgical anesthesia that they appear to the naked eye to be completely lifeless. They are so completely unresponsive to any stimuli that they have lost both their palpebral (blink) and toe pinch reflexes. Nevertheless, they may still only be in Stage III, Anesthesia, and their vital functions have not been completely depressed. Therefore, an appearance of lifelessness and lack of reflexes alone are not sufficient to conclude that an animal has died.

The apparent lack of breathing alone cannot be definitively relied on. While an animal cannot survive without breathing oxygen into their lungs, an animal experiencing the effects of surgical anesthesia may take breaths that are so shallow and infrequent that they can be missed by mere observation. A stethoscope must be used to ensure that there is no more heartbeat. It is important to note, however, that untrained ears, particularly when using an an inexpensive stethoscope, may miss the presence of a very faint, weak heartbeat. Even on a fully conscious, 100 lb, overweight dog that is standing up with his tail wagging! Imagine, then, how difficult it can be to definitively determine the absence of heartbeat in a surgically unconscious animal. For this reason, euthanasia technicians must receive proper training in using a stethoscope, and must have high quality, reliable equipment when using this method to verify death.

In some instances, a CET may supplement the use of a stethoscope with one of two additional methods of confirming that all basic life support functions of the animal's body have ceased: a) wait several hours for rigor mortis to set in; or b) use the intracardiac method to determine that the animal's heart has ceased beating. While either method is acceptable, **the presence of rigor mortis is the only indisputable, unmistakable proof of death**; however, in the shelter environment, where time is often of the essence, the intracardiac method is most commonly used, after death has been confirmed by multiple other methods (Look, Listen, Feel).

Confirmation of Death by the Intracardiac Method

The intracardiac method to confirm death involves the insertion of a needle and syringe directly into the heart of the fully unconscious animal.

IMPORTANT NOTE: A needle must never be inserted into the heart of a conscious animal. The CET must be certain that the animal has no blink or toe pinch reflexes before the intracardiac method is performed.

Once the needle has pierced the heart muscle, any movement of that muscle will be transferred to the syringe, which will then mimic the heartbeat extremely accurately. Imagine that the animal's heart is the base weight of a metronome, and the syringe is the metronome's pendulum. When the heart muscle moves the base of the metronome, the syringe protruding from the base will swing in response. If the syringe is not reflecting any movement at all (assuming it was properly placed in the heart muscle), it can be definitively determined that the heart has ceased beating, and death can be confidently confirmed. If any movement is noted an additional dose of sodium pentobarbital must be given to the animal.

To perform an intracardiac method for confirmation of death, one uses essentially the same technique as for giving an IC injection (see Chapter 8), except that the syringe attached to the needle is empty. If the animal is particularly obese or has a broad, barrel chest, switching to a longer needle, like an 1 ½ inch needle, may be required.

IMPORTANT NOTE: The intracardiac method to confirm death is not an acceptable practice when the euthanasia is being viewed by the animal's owner or by another a member of the public. Although this final step is not conducted until after the CET has confirmed that the animal is fully unconscious and completely unable to feel pain, to the uninitiated, viewing a needle in the heart may be very disturbing. In these situations, extra care must be taken to ensure that the determination of death is 100% accurate. In addition to using a stethoscope to verify the absence of a heartbeat, the CET should verify that the gums and mucous membranes of the animal's mouth have turned a blueish/purpleish color (this is called cyanosis, it indicates the lack of oxygen in those tissues). The technician may also test for a lack of rectal sphincter tone.

Rigor mortis may be used as a method to confirm death. Rigor mortis is defined as the state of muscle rigidity that occurs in mammals after death. In full rigor, the animal will be rendered completely stiff, essentially frozen into the position in which they died. Signs of rigor mortis can be usually observed within one half hour of the injection, but it could take as many as several hours after death, depending on the air temperature and other factors. During this period, the body should be covered with towels; sheets; or tarps whenever possible; showing respect for an animal throughout the complete euthanasia process is essential.

IMPORTANT NOTE: After about 12 hours the animal will pass out of rigor mortis and lose the telltale full body stiffness as the body begins to decompose. Therefore, it is important to ensure the proper window of time is factored when using rigor mortis to verify death. Additionally, there are times when mammalian and non-mammalian species exhibit body rigidity that mimics rigor mortis. Care must be taken not to identify an animal as deceased when it is not.

CHECKLIST for Verifying Death

LOOK FIRST	
No breathing	
No blink reflex	
No toe pinch reflex	
Gum color changed to gray or blue	
No blanching of gums when pressed (no CRT)	
No movement of skin over heart	
THEN FEEL	
No pulse	
No heartbeat felt over chest	
NOW LISTEN	
No heart sounds heard with stethoscope	
FINAL CHECK	
No movement of syringe when needle placed in intracardiac space	
Rigor mortis seen	
OK TO PROCEED WITH BODY DISPOSAL	

CHAPTER 10

Body Disposal

The euthanasia process does not end with verification of death but also includes body disposal. It is critical that the animal's remains are cared for in an ethical and environmentally sound fashion. After confirmation of death, the body should be placed in a bag with animal identification. Then the body should be placed in temporary storage and the euthanasia room must be cleaned before another animal is brought into that space.

Bodies are held in temporary storage until a final disposition can be arranged. Temporary storage is typically either cold storage (40° F) or a freezer (32° C). Permanent arrangements for body care may occur at the shelter or may involve offsite disposal.

There are five types of permanent body disposal: cremation, burial (communal or individual), compost, render and aquamation. Shelters typically opt for cremation or communal burial. Composting and rendering are more frequently used for horses and livestock. Aquamation is a relatively new form of body disposal that is beginning to be implemented for companion animals.

Several factors determine the best method of disposal for animal bodies, including the number of animals handled, state and local ordinances regulating the disposal of dead animals; financial considerations; and local public acceptance of the various methods available.

Cremation is a frequent method of body disposal in animal shelters. Some shelters have cremation units and provide services onsite. More frequently shelters have contracts with off-site services who provide cremation. Because this method of body disposal results in temperatures of 1100-1200° F, the drugs used for euthanasia (and other drugs as well) are destroyed making this an effective way to reduce environmental contamination. Cremation is also an effective way to destroy infectious agents.

Burial is also a common body disposal method used by animal shelters. Typically, shelter animals are buried in communal graves in landfills. Although bodies decompose when buried, the drugs present in the animal do not. Environmental contamination of water sources and accidental exposure of scavengers to euthanasia drugs is a significant concern with burial. States and municipalities may have specific requirements for burial and may not allow this route of disposal. Frequently there are laws in place regarding how far graves must be from a water source. There may also be legal requirements for closing graves to mitigate other animals' exposure.

Another alternative to disposing of animal bodies is to engage the services of a rendering company, which processes animal bodies into fertilizers and other products. This is a disposal method frequently used for large animals like horses or livestock. Bodies sent to a rendering plant must be free of euthanasia and other drugs as well as infectious diseases. Rendering relies on steam at temperatures of 265° F which is not high enough to inactivate most drugs and many infectious agents. This method of disposal MUST NOT be used for animals who have received pre-euthanasia and/or euthanasia drugs.

Composting has been proposed as a new disposal option, particularly for disposal of large animals. However, composting does require careful layering of organic substrates and oxygen. Body decomposition takes 4-6 months. Environmental concerns include water contamination and scavenger exposure to euthanasia drugs.

Aquamation or alkaline hydrolysis utilizes water and lye to break down the body and results in "ashes" which are similar but not exactly equivalent to the ashes from the cremation process. It is a more energy efficient way to implement body disposal. Currently aquamation is costly, which may discourage shelters from considering this route of body disposal. Aquamation is not legal in all states.

No matter what method of disposal is used, the animal must be handled humanely and respectfully throughout the euthanasia process, from initial selection as a euthanasia candidate, through injection and verification of death, and ultimately through disposal of their body. **It is unacceptable for any person to treat an animal's body after death with any less care and reverence as would have been given while the animal was still alive.**

Animals suspected of having rabies should be handled and managed by trained personnel, in accordance with applicable state laws. Even though there has never been a case of human rabies acquired through the process of collecting and testing specimens, contact with saliva, mucous membranes, salivary glands, spinal cord tissue and/or brain tissue could be hazardous. CETs handling rabies-suspect animals must always wear personal protective equipment (gloves, face/eye shield, gown, etc.) and should have received pre-exposure rabies vaccinations. General guidelines for preparing specimens for rabies testing are:

- Rabies-suspect animals should be humanely euthanized in a manner that preserves the brain.
- For small mammals like bats or rodents, the whole body can typically be submitted to the testing facility. In the case of larger animals like cats and dogs, the head of the animal should be severed at the base of the skull (between the foramen magnum and the atlas) and submitted for testing, so as not to damage the sections of the brain required for testing. Livestock, equines, etc. must be handled by a veterinarian or other individual specially trained to remove the brainstem.
- Axes, hatchets, power saws, etc., should not be used for decapitation, since they not only create a danger of flying bone and tissue. They also create the potential for aerosolizing virus-contaminated fluids. Shears and hacksaws are preferred tools.
- Specimens should be kept refrigerated. Avoid freezing rabies-suspect animals, since the thawing process can delay testing.
- Carefully sanitize or dispose of not only the remainder of the animal's body but any surfaces (including soil) that may have been contaminated with bodily fluids.

CHAPTER 11

Keeping People Safe

NOTE: Nothing in this chapter should be regarded as medical advice. Always consult a physician for evaluation or treatment of any injury.

While participating in euthanasia does pose inherent risks, as is the case with virtually any activity involving animals, proper training and education are vital to help avoid injuries. It is incumbent on facility managers to provide the tools, training, and other resources that staff and volunteers need to minimize risks to the greatest extent possible.

Animal Shelter Safety Concerns

- Accidental exposure to controlled drugs
- Intentional exposure to controlled drugs
- Zoonotic diseases
- Dangerous animals/situations
- General safety
- Compassion fatigue

The information presented in this section is meant to increase staff safety during the euthanasia process, applies to all work being performed. Working in pairs, for example, not only helps reduce the chance that an incident might occur (a second pair of eyes is always useful for spotting trouble before it happens). It also ensures that someone is there to restrain the animal and summon help, should a crisis arise. Having proper tools like nets and control poles, and ensuring that they are in good working order, is vital to ensuring that response to incidents is immediate, effective and humane. First aid kits and other safety supplies should be accessible and restocked as necessary.

Finally, acknowledging incidents, discussing how they can be avoided in the future and implementing changes based on lessons learned, is of utmost importance. If staff cannot discuss problems because they fear they will be rebuked or disciplined, opportunities for prevention of future incidents are lost.

Keeping People Safe

- Clear policies
- Adequate training
- Time management
- Equipment
- Teamwork
- Work in pairs
- OSHA Compliance

A significant hazard encountered in animal shelters is accidental or deliberate exposure to controlled drugs. Other common concerns include exposure to dangerous animals or situations. Dangerous situations can be encountered when interacting with the public, resulting in risks to personal safety. Certainly, bites and scratches as well as more serious animal induced injuries are a very real possibility in the shelter. Other general injuries such as those associated with lift, or “slip-and-fall” incidents, can be frequent occurrences in the shelter venue. Employees, staff and even the public must practice situational awareness in the shelter environment. Finally, staff and volunteers associated with animal shelters frequently struggle with compassion fatigue.

Accidental Exposure to Controlled Drugs

Accidental exposure to controlled drugs is not infrequent. When this occurs, remember that the "solution to pollution is dilution." Dilute the substance with water for most forms of exposure. If the substance is inhaled, dilute with fresh air.

If the drug gets in the eyes, flush the eyes for 15 minutes and then seek medical attention if necessary. If it gets on the skin, wash the area with copious amounts of water. If it gets in the mouth, rinse the mouth with water and spit. If it is accidentally ingested, seek medical advice about whether to induce vomiting.

Remember, if there is any concern about the exposure, seek medical attention.

A Special Note About Eye Injuries:

Sodium pentobarbital and pre-euthanasia drugs can cause significant injury if they are sprayed into a person's eyes. This most typically occurs when the needle pops off the syringe during injection, either because the needle was not properly secured or because the needle became clogged and could not withstand the pressure applied during injection. When any drug contacts with the eye, the situation should be treated as a medical emergency. The eye immediately should be flushed voluminously with water (which is why it is advisable to have an emergency eyewash station in the euthanasia room). Contact lenses should be removed immediately, and first aid procedures for this type of injury should be immediately undertaken

The use of locking syringes, the selection of appropriately sized needles, and the steady administration of pressure can help prevent needles from accidentally popping off, and using clean needles every time can help avoid blockage. Nevertheless, the only way to definitively avoid any risk of accidental eye injury is by requiring staff to wear protective eyewear.



For worker safety, a euthanasia room should ideally contain an eye wash station

Deliberate Exposure to Controlled Drugs

Diversion of controlled drugs is a very real concern in the shelter setting. Remember that access to these drugs to perform euthanasia is a privilege and comes with responsibilities. Controlled drugs must be stored in a securely locked and substantially constructed drug safe. Access should be limited to only shelter personnel who have been trained and recognized by the state-controlled substance agency. All acquisition of drugs as well as daily use must be recorded in a controlled drug log and the physical inventory must match the amount recorded in that log. If significant shortages are found, the DEA must be immediately notified. Federal and state laws are discussed in Chapter 12.

Exposure to Zoonotic Diseases

Zoonotic diseases are infectious agents that are contagious to humans. The most famous example is rabies. There are many other zoonotic diseases including leptospirosis, salmonella, cat scratch fever, ringworm parasites and others. It is critical to use good hygiene when dealing with zoonotic disease. Remember, "the solution to pollution is dilution." This means a critical step is washing hands to prevent self-exposure. Your hands may be harboring the zoonotic disease. Similarly, personal protection equipment that can be donned and doffed should be used with suspected infectious agents. Finally, food and drink should NOT be present in the euthanasia room.

Exposure to Dangerous Animals and Dangerous Situations

Even though most injuries, including bites and scratches, can be avoided through skilled handling, incidents can still occur. If a technician or handler is injured, the following procedures should be followed:

- Ensure that the animal is immediately secured and unable to inflict additional injury
- Treat the injury as appropriate
- Report the injury to both shelter management and public health officials
- Ensure that the animal is properly evaluated for rabies
- Debrief about what happened, and how the incident could have been avoided
- Take steps necessary to correct any deficiencies in policies and procedures

General Safety

General safety, such as falling on a wet surface or exposure to loud noises that impact hearing, are commonplace. Needle sticks are a frequent occurrence in animal shelters. Finally, ergonomic stressors such as back and shoulder injuries are commonly encountered in sheltering operations.

Most environmental injuries are the result of inadequate safety measures, vague procedures or human error. Accidents that result from the first two causes may be reduced by providing proper training, solid procedures and a good selection of quality restraint equipment. Human error, unfortunately, is impossible to completely eliminate. Because of the nature of the work, the euthanasia area is the site of many potential work hazards, such as slippery fluids or hair clippings on the floor, cage doors left open, etc. A good way to minimize injuries from these sources is to provide staff with adequate time to accomplish their tasks effectively, thoroughly, and without hurrying or cutting corners.

Staff may also suffer back strain or other injuries from lifting or restraining animals. Staff should be trained on proper lifting techniques, and should have equipment such as stretchers available to ease physical burdens.

A Special Note on Needle Sticks:

CETs can be injured by accidental needle sticks. If an animal becomes excited and bumps the hand holding the needle during injection, or if the technician becomes careless or distracted while holding an uncapped needle, the possibility exists that the needle will cause a puncture injury (called a needle stick). If an accidental needle stick occurs, run the wound under water immediately to help flush out any bacteria that may be pushed into the wound, and cover it, then promptly seek medical attention.

The primary danger from a needle stick arises from the puncture itself. The risk of danger from drugs being injected during an accidental needle stick is actually quite low. This is not because the drugs are any less lethal to humans than they are to animals, but because the quantities necessary to affect a person are unlikely to be injected accidentally. Typically, when an accidental puncture occurs, only a minute amount of drug is injected before the technician reflexively reacts to the pain of the puncture and removes the needle. Such incidents usually cause nothing more serious than some pain or tingling at the injection site. Nevertheless, immediate medical attention should be sought whenever accidental injection of even small amounts of drug occurs, since the possibility of an allergic or other reaction exists.

The risk of needle injuries can be greatly reduced by leaving the cap on the needle until just before the injection is made, and by not using risky shortcuts like pulling the cap off of a needle with the teeth or worse, trying to reinsert a needle into a cap held between the teeth. Using a clean needle each time will help reduce the risk of infection if a needle stick does occur. But perhaps most important to avoiding accidental needle stick injuries is clear, effective communication between the CET and the handler to identify and prevent potentially risky situations before they occur.

Compassion Fatigue / Euthanasia Related Stress

See Chapter 13.

CHAPTER 12

Controlled Drug Laws

Any agency using sodium pentobarbital or other controlled substances must adhere to the strictures of the Controlled Substance Act (part of the Comprehensive Drug Abuse Prevention and Control Act), passed in 1970 and enforced by the Drug Enforcement Administration (DEA). This law classifies drugs into five major categories (called Schedules) according to their abuse potential, and strictly regulates their manufacture, distribution, and handling according to their potential risks and medical benefits.

Under federal law, animal shelters are not expressly permitted to obtain or use controlled drugs such as sodium pentobarbital (which is listed as a Schedule II controlled substance). However, the DEA recognizes mid-level practitioner status which means that certain professions have access to controlled substances as part of their profession (a pharmacist is considered a mid-level practitioner). Mid-level practitioner status must be conferred by individual state law. Currently the majority of states and territories recognize animal shelters as a mid-level practitioner allowing access to the drugs necessary for the purpose of euthanasia.

Most shelters obtain the drugs they need to perform euthanasia in one of three ways:

1.They may hire a staff veterinarian who can obtain drugs pursuant to their professional license. This is the most ideal circumstance, but unfortunately many agencies do not have veterinarians on staff.

2. They may partner with an off-site veterinarian who has an established veterinary client patient relationship (VCPR) with the shelter and acts as the veterinarian of record (VOR) for that shelter. They will complete registration with the DEA for the shelter's facility and a DEA license in their name at the address of the shelter will be issued.

Some states do not recognize animal shelters as mid-level practitioners. This makes a partnership with a veterinarian necessary to perform euthanasia. The veterinarian agrees to provide drugs to the agency; in such cases, thus the veterinarian assumes all responsibility for ordering and obtaining the drugs, administering their use, ensuring their security, overseeing inventory, and reporting any losses or theft to the DEA.

3. They may take advantage of a state law that enables direct licensing of shelters, allowing them to obtain and use drugs without the direct oversight of a veterinarian. Assuming that the shelter's euthanasia technicians have been properly trained, this is the best scenario for shelters that do not have a veterinarian on staff.

No matter which scenario listed above applies to a shelter, a VCPR and VOR relationship is necessary for shelters to perform euthanasia. A veterinarian must develop a standard operating procedure (SOP) for euthanasia including drugs, doses and routes used. This SOP will also include pre-euthanasia drugs as well as euthanasia drugs.

Controlled Drug

Schedule I: drugs that have a high potential for abuse and no currently acceptable medical use.

Schedule II: drugs that have a high potential for abuse but have a currently acceptable medical use (sodium pentobarbital).

Schedule III: drugs that have less potential for abuse and have a currently acceptable medical use (tiletamine/zolazepam, ketamine, sodium pentobarbital mixes).

Schedule IV: drugs that have a low potential for abuse and have a currently acceptable medical use.

Schedule V: drugs that have the lowest potential for abuse and have a currently acceptable medical use.

For the full list of controlled substances and their classifications please refer to: *deadiversion.usdoj.gov/ schedules/orangebook/ c_cs_alpha.pdf*

All shelters that use euthanasia drugs must meet federal requirements for the storage, record-keeping, inventory, and disposal of controlled substances, as well as any applicable state laws and regulations, which may be even more stringent than the federal requirements.

For specific information about laws of your state, contact the appropriate regulatory agency, such as the state board of pharmacy, board of veterinary medicine, or state animal control or humane association.

Bear in mind that when more than one legal requirement applies (for instance, if there are both federal and state requirements relating to storage of drugs), the agency must meet or exceed whichever version is more strict.

Know Your Laws

- What are the minimum hold times animals must be held before adoption transfer, or euthanasia? Are there any exceptions?
- Does your jurisdiction permit you to apply to obtain, possess, and use euthanasia drugs directly or only with veterinary authority and oversight?
- What are the training and certification requirements for performing euthanasia?
- What drugs are permitted? (For example, some states prohibit the use of sodium pentobarbital in powder form; other states dictate which pre-euthanasia drugs may or may not be used.)
- What administration methods are permitted? (For example, some states prohibit oral administration of sodium pentobarbital.)
- Are there other laws that may affect how euthanasia is performed? (For example, in some states mixing of ketamine and xylazine is prohibited as a violation of pharmacy compounding laws.)

Storage

Federal law specifies that all controlled substances be stored in a "substantially constructed," securely locked cabinet. The law does not define exactly what constitutes "substantially constructed," so organizations must look to the intent of the provision for guidance. Since the intent of the requirement is to deter theft or misuse of drugs, they should be stored in a cabinet that is either permanently constructed or attached to a building structure to prevent physical removal. The following are suggestions to ensure safe and lawful storage of drugs; agencies should check with their local DEA office for more specific recommendations.

- Store the central supply of controlled substances (the unopened, sealed bottles) in a floor safe (cemented into the floor), a safe securely bolted to the floor, or a safe weighing more than 750 pounds. Store the daily supply (opened bottles) of controlled substances in a double-locked steel cabinet bolted to the wall.



A wall-mounted drug safe for storing controlled substances

- If state regulations allow controlled substances to be carried in a vehicle, such supplies should be kept in a locked box that is securely fixed to the inside of the vehicle.

- Access to the drug supply should be limited to supervisors, veterinarians, and properly trained and certified euthanasia technicians.

- For high volume shelters with a large supply of controlled substances kept on hand, a security alarm or surveillance system should be installed as additional protection.

- A master drug inventory log recording every time the supply safe is opened should be maintained to ensure that the inventory remains accurate. This log should be separate and distinct from the euthanasia log used to record each euthanasia performed. The individual bottle numbers, etc., should be capable of being cross-matched. A witness should be present and the drugs counted every time a staff member opens the safe, and the log should be updated with each new shipment received or bottle removed for use in the shelter. The log should include:

a. The drug's shipment lot number and manufacturer/distributor name;

b. The drug type and name;

c. The in-house assigned bottle numbers (used to match specific bottles with specific animals on the euthanasia log);

d. The drug's strength, volume, and expiration date;

e. The date and amount of drug (number bottles in consecutive order) received;

f. The date and amount of drug (number bottles in consecutive order) removed.

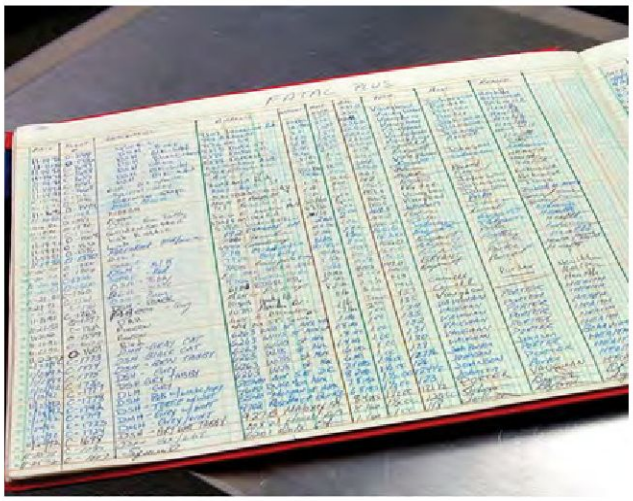
When more than one controlled substance is used at a facility, each controlled substance must have its own section within the log book. It is good practice to track each drug used in the euthanasia process, even those that are not considered to be controlled substances.

IMPORTANT NOTE: A separate record keeping log for CII drugs is a federal requirement by law. Remember that sodium pentobarbital is a CII drug and therefore requires a separate record keeping log.

Record-Keeping Requirements

A detailed log recording the exact use of controlled substances for euthanizing individual animals is also required to be maintained by shelters. These records should be kept in a bound logbook with numbered pages rather than in anything with detachable pages, such as a loose-leaf binder. The following information is required to be included in the euthanasia log:

- The type of drug(s) used
- The in-house number assigned to the bottle(s) from which the drugs were drawn
- The name of the person administering the drug
- The description (species, perceived breed) of each animal euthanized
- Each animal's identification number
- The weight of the animal euthanized
- The amount of each drug used
- The total amount of the drug remaining in each drug bottle after use (this record should demonstrate that 100% of the drug from each bottle was utilized)



Sample page from a euthanasia logbook

Inventory Records

Federal law requires that a full, detailed inventory of all controlled substances be performed at least every two years (individual states may impose more stringent requirements; some states require daily or weekly confirmation of inventory by physical counts). However, it is recommended that shelters inventory their controlled substances much more frequently, ideally weekly or daily. This constant close monitoring helps keep the inventory process simple, and it helps to promptly account for any discrepancies between the records and the shelter supply of controlled substances.

Shelters must maintain inventory and other records of controlled substances on site for a minimum of two years, and these are required to be kept separately from ordinary business records. All records, including those kept on computer files, must be easily readable and retrievable for DEA inspection on demand.

Reporting Theft/Loss

Federal law requires that loss or theft of any controlled substance be reported to a DEA field office immediately. Disposal of outdated or unwanted controlled substances must follow strict DEA requirements.

> Penalties for failing to comply with state and federal drug laws can range from minor fines to possible criminal charges, depending on the nature of the infraction.

Training of Euthanasia Technicians

There are no specific federal regulations regarding the training of shelter personnel utilizing controlled substances; however, most states have specific training and certification requirements in place. For specifics about certification requirements for your state, contact the appropriate regulatory agency, such as the state board of pharmacy or board of veterinary medicine, or state animal control or humane association.

CHAPTER 13

Compassion Fatigue: Euthanasia and Occupational Stress

Contributed by Jessica Dolce, MS, certified compassion fatigue educator

Animal care, welfare, and protection are complex, high-stress, trauma-exposed professions. Similar to other helping professionals, such as first responders, social workers, and healthcare workers. Animal shelter personnel are exposed to a variety of on-the-job stressors, including direct and indirect trauma, grief and loss, difficult working conditions, and systems challenges, as well as stressors in their personal lives.

These factors can contribute to animal shelter professionals, in any role, developing occupational stress injuries such as empathic strain, burnout, secondary traumatic stress, moral injury, PTSD, and other stress-related outcomes.

Occupational Stress: Defining the Terms

Compassion fatigue, now referred to as empathic distress or empathic strain, is a predictable outcome of working with animals and people who are suffering or traumatized.

Empathic strain can be understood as a profound depletion that arises over time due to the demands of working in an intense caregiving environment in which helpers feel the pain, stress, and emotions of others (Mathieu, 2012). When experiencing empathy for other beings who are suffering, the brain network associated with physical pain is activated (Singer, 2014).

Over time, this repeated activation of the pain network becomes fatiguing and can lead to symptoms such as erosion of empathy, numbness, irritability, cynicism, guilt, an overdeveloped sense of responsibility, and hopelessness.

Often described as "the cost of caring" (Figley, 2006), empathic strain is an occupational hazard in the animal welfare sector regardless of role, gender, or experience, and is not confined to individuals directly involved in euthanasia.

Secondary traumatic stress (STS) is the experience of being significantly negatively impacted by indirect exposure to animals and people who have experienced direct trauma.

STS can develop after hearing about a traumatic event, witnessing its aftermath, or viewing related photos or court evidence. Symptoms can include all of the above empathic strain symptoms, as well as hypervigilance, intrusive thoughts, nightmares, flashbacks, anxiety, avoidance, anger, and a profound change in worldview (Mathieu, 2012).

Individuals can develop Post Traumatic Stress Disorder (PTSD), a mental health condition, as a result of indirect or direct exposure to trauma.

Moral injury refers to the distress one experiences when they perpetrate, witness, or fail to prevent acts that violate their moral beliefs, values, or ethical codes of conduct. Symptoms include guilt, shame, disgust, and anger.

Grief refers to the natural reaction to loss, and can influence the physical, emotional, cognitive, behavioural and spiritual aspects of an individual's health.

Burnout describes the physical and emotional exhaustion that workers can experience when they have low job satisfaction and feel powerless and overwhelmed at work. Burnout is not specific to any profession, but rather from interactions with working conditions. Symptoms include emotional exhaustion, disengagement, negativity, and reduced professional efficacy (Moss, 2021).

Compassion Fatigue in the Animal Care Community (2006) delineates various working condition stressors that contribute to these phenomena, highlighting the multifaceted nature of occupational stress within this context.

How does euthanasia impact animal shelter professionals?

The *caring-killing paradox*, as articulated by Arluke (1991), refers to the complex reality faced by shelter workers who are required to euthanize animals for whom they have been providing care and protection. This paradox underscores the unique emotional and moral dilemmas encountered by these workers.

Demands of animal care	Lack of clarity about responsibilities	Stressful relationships with coworkers	Work/life balance	Management stressors
Too much to do & too little time	How everyone fits in	Poor relationships with others	Inflexible work schedules	Lack of control over schedule, work
Inadequate training and supervision	Dealing with the public	Bullied	Emergency calls	Lack of clear and consistent messages
Dealing with the public		Discrimination	Dangerous situations with animals or people	Negative work culture
		Harassment	Dangerous working conditions (facilities)	Lack of rewards for successes

Figley, C.R. & R.J. Roop. Compassion Fatigue in the Animal-Care Community

Research indicates that, in addition to the inherent stress of participating in euthanasia, animal shelter workers identify several factors contributing to euthanasia-related work strain. These include a lack of social/familial support, a lack of support or conflict with coworkers who do not conduct euthanasia, and negative attitudes/behaviors from the general public (Rogelberg, 2007; Nguyen-Finn, 2018).

Importantly, some shelter workers perceive the act of euthanasia as a compassionate and meaningful dimension of their work, seeing it as a necessary intervention to alleviate animal suffering. Consequently, it is essential to recognize that euthanasia is not always the predominant source of stress for these professionals.

A study conducted by Andrukonis, Hall, and Protopopova (2020) found that the act of **euthanasia is not a *unique* predictor of overall occupational distress**, meaning other job stressors may contribute more to occupational stress than euthanasia.

Nevertheless, research focusing on employees who participate directly in euthanasia and/or the euthanasia decision-making process has identified these job tasks to be significant risk factors for occupational stress outcomes.

Quantitative and qualitative research findings for animal shelter workers include:

1. Direct participation in euthanasia has a **significant impact on mental health** (Nguyen-Finn, 2018), including higher work stress, stress-related somatic complaints, and work-to-family conflict, and **lower levels of satisfaction with work** (Rogelberg, 2007);

2. Individuals who participate directly in euthanasia have higher scores of **secondary traumatic stress** (Nguyen-Finn, 2018) and **moral injury** than their colleagues who do not participate in such tasks (Andrukonis and Protopopova, 2020);

3. Decision-making in the context of euthanasia, particularly regarding which animals to euthanize, is predictive of increased **secondary traumatic stress**, indicating that the pressure associated with these decisions can be traumatic (Andrukonis and Protopopova, 2020);

4. Direct engagement in euthanasia has been linked to **physiological stress** responses, such as increased heart rate (Andrukonis, Hall, and Protopopova, 2020);

5. Increased contact with animals prior to euthanasia predicted **higher burnout and traumatic stress levels** (Andrukonis, Hall, and Protopopova, 2020);

6. Higher rates of dog euthanasia were associated with **increased employee turnover** (Rogelberg, 2007);

7. Higher live release rates (more positive outcomes) were associated with **higher levels of job satisfaction, lower levels of moral injury, and higher levels of secondary traumatic stress and burnout** (Andrukonis and Protopopova, 2020), indicating that employees working in limited-admission and private shelters experience high distress levels similar to those working in high-volume municipal shelters.

The body of research consistently indicates that direct involvement in euthanasia, whether through the act itself or the associated decision-making process, constitutes a notable risk factor for moral injury, traumatic stress, and burnout among animal shelter workers, even in contexts where positive outcomes are prevalent.

What about grief?

Limited research has been conducted on grief in animal shelters; however, a 2020 paper titled "Exploring the loss and disenfranchised grief of animal care workers" highlights that animal care workers face **stress-inducing losses at work when their relationships with animals come to an end** due to various factors, such as adoption, transfers, and euthanasia.

Their grief often goes unrecognized and undervalued, which can be described as *disenfranchised grief,* by their personal support systems. Additionally, there is a lack of acknowledgement or support at the organizational level, including the fact that animal care workers are not usually permitted the opportunity to process their losses.

What are the protective factors for individuals involved in euthanasia?

While there is overlap between symptoms, the varying types of occupational stressors typically necessitate different strategies and interventions.

For instance, burnout can be addressed by changing working conditions or adjusting one's relationship with those working conditions through setting boundaries, reducing rumination, adjusting expectations, and increasing support.

Conversely, traumatic stress is most effectively addressed through therapeutic interventions, such as EMDR, Somatic Experiencing, Cognitive Processing Therapy, Neurofeedback, and Mindfulness-Based Cognitive Therapy, under the care of a mental health professional.

In all scenarios, both individual (self-care) and organizational (we-care) strategies should be implemented to mitigate risks for those participating in euthanasia.

Recommendations for employees on how to cope at work (Baran, 2009):

- **Build technical competence and skill:** increase confidence through training, "practice proper euthanasia techniques", etc.
- **Use specific euthanasia strategies:** schedule euthanasias for the end of the shift, so you can go home right after, "have someone else euthanize special pets," such as animals you've increased contact with or certain types of animals you feel a connection to.
- **Be mindful of how you think and talk to yourself:** try to reduce rumination, make an effort to reflect on the meaning and impact of work, see the big picture, offer self-compassion instead of self-criticism, and "don't blame yourself."
- **Practice emotional regulation strategies:** use grounding and stress management techniques, practice compassionate detachment in the moment, "acknowledge your feelings," and seek support.

Recommendations for employees on how to cope outside of work (Baran, 2009):

- **Separate yourself from the job with healthy boundaries:** have good boundaries with work, participate in hobbies, take time for your own needs, and "seek a diversion."
- **Get help and ask for support:** seek out social and family support, peer support groups, and "seek external help" from mental health professionals and mentors.
- **Understand and advocate for long-term solutions for root causes:** work towards changing policies or programs, "learn about and promote responsible pet ownership," etc.
- **Consider withdrawal:** ask for a break from euthanasia, switch to a new role, and "know that the job is not for everyone."

The role of the organization

Organizations must take responsibility for establishing policies, practices, and relationships that act as protective factors to mitigate occupational hazards - both physical or psychological - including those associated with euthanasia duties.

Animal shelters must commit to cultivating a work environment that promotes employee well-being and fosters personal and professional growth. It is essential for shelters to regularly provide information and training related to work stress and its impact on well-being.

Conversely, if the shelter is a toxic environment, individual employees will likely struggle to overcome the negative work culture and maintain their occupational well-being. According to the Stanford Model of Occupational Well-Being, personal resilience accounts for 33% of an individual's professional fulfillment, while the organization is responsible for 66% by fostering effective practices and a culture of well-being.

Efficiency of practice entails the implementation of processes and practices that ensure safety, quality, and effectiveness. It also involves encouraging positive interactions among colleagues and with the public, as well as recognizing and rewarding work-life balance. Specifically relating to euthanasia, research indicates:

Practices that were associated with decreased turnover rates: (Rogelberg, 2007):

- Provision of a designated euthanasia room;
- Exclusion of other live animals from the vicinity during euthanasia;
- Removal of euthanized animals from a room before the entry of another animal to be euthanized;
- Making euthanasia decisions based on behavior and health reasons (as opposed to lack of space, resources).

Strategies for managers and leaders (Rogelberg, 2007):

- "The most popular…suggestions had to do with promoting understanding and support between euthanasia technicians and non-euthanasia employees who work side-by-side."
- Provide counseling and professional help;
- Be supportive and encourage support from others;
- Allow for the rotation of euthanasia staff;
- Hire or provide more staff to do euthanasia;
- Allow for breaks and time off from euthanasia;
- Conduct debriefing sessions;
- Offer compassion fatigue workshops.

In the 2020 study titled "*Occupational Health of Animal Shelter Employees by Live Release Rate, Shelter Type, and Euthanasia-Related Decision,*" the authors recommend addressing the decision-making process to reduce distress:

"If the most difficult euthanasia-related decision is deciding which specific animal will be euthanized, then it may be beneficial for shelters to **implement a multi-level approach to euthanasia-related decisions**. This may lessen the decision-making burden on a specific person by sharing it amongst the group. It would provide a **protective buffer for individuals directly involved in euthanasia-related decisions.**"

This aligns with findings of the informal 2023 animal shelter survey, "*Euthanasia Decision-Making: Communication and Support Practices*," led by Jessica Dolce, founder of The Compassion in Balance Program. In this survey, **workers shared effective strategies their organizations have implemented to alleviate the distress associated with euthanasia decision-making**. Recommendations for leaders include:

- Proactively create clear, expert-informed medical and behavioral guidelines/criteria for euthanasia for decision makers to utilize;
- Hold regular meetings to discuss the needs of individual animals;
- Encourage respectful, constructive discussion and disagreement about decisions; implement guidelines to support these discussions;
- Communicate with staff consistently, transparently, and predictably regarding how and when euthanasia decisions are made;
- Give staff autonomy regarding involvement in the euthanasia process (including the choice to be present or not, to say goodbye, memorialize, take breaks, etc.);
- Support staff wellbeing through access to mental health services, informal and formal debriefing, opportunities for peer support, and acknowledge grief via memorials and/or rituals;
- Validate strong emotions, without allowing emotional reactivity to harm others, and if an employee is consistently distressed, consider a role change or termination;
- Hold employees, who are not directly involved in euthanasia, accountable for harmful behavior towards their coworkers who are directly involved in euthanasia and euthanasia decision-making through conversations, education, setting clear expectations and boundaries, and implementing disciplinary action when necessary.

Conclusion

Working in any role in an animal shelter entails predictable risks, including empathic strain, secondary traumatic stress, moral injury, and burnout. However, research indicates that participating in euthanasia and euthanasia decision-making may put employees at higher risk for moral injury, traumatic stress, and burnout. Therefore, euthanasia technicians and decision makers require additional support.

Individuals can take proactive steps to mitigate these risks by increasing protective factors. This can include seeking peer and mental health support, forming healthy boundaries, requesting breaks, opting out of specific euthanasia, or for additional support, increased technical skill training, and learning and implementing cognitive skills, such as reduced rumination and emotional regulation practices.

Organizations also have a responsibility to create healthy working conditions that minimize the risks of these predictable occupational hazards. By offering more support—including mental health services, autonomy, training, transparent communications and conflict resolution, safer working conditions, increased staffing, and clear, expert-informed processes —shelters can strengthen protective factors for employees involved in euthanasia.

Achieving this requires a well-managed and efficient shelter, which is possible when organizations follow best practices outlined in the ASV guidelines. Particular emphasis must be placed on population management. Poor population management not only jeopardizes animal care but also negatively impacts human well-being and operational efficiency, ultimately leading to compassion fatigue, burnout, traumatic stress, and turnover among staff.

SOURCES

1. Andrukonis A, Hall NJ, Protopopova A. The Impact of Caring and Killing on Physiological and Psychometric Measures of Stress in Animal Shelter Employees: A Pilot Study. Int J Environ Res Public Health. 2020 Dec 9;17(24):9196. doi: 10.3390/ijerph17249196. PMID: 33317016; PMCID: PMC7764342.
2. Allison Andrukonis & Alexandra Protopopova (2020) Occupational Health of Animal Shelter Employees by Live Release Rate, Shelter Type, and Euthanasia-Related Decision, Anthrozoös, 33:1, 119-131, DOI: 10.1080/08927936.2020.1694316
3. Arluke A. Coping with euthanasia: a case study of shelter culture. *J Am Vet Med Assoc* 1991;198:1176–1180.
4. Baran BE, Rogelberg SG, Lopina EC, et al. Shouldering a silent burden: the toll of dirty tasks. *Hum Relat* 2012;65:597–626.
5. Baran BE, Allen JA, Rogelberg SG, et al. Euthanasia-related strain and coping strategies in animal shelter employees. *J Am Vet Med Assoc* 2009;235:83–88.
6. Dolce, Jessica. "*Euthanasia Decision-Making: Communication and Support Practices Survey*." 2023. compassioninbalance.com/2023-Euthanasia-Communication-and-Support-Survey
7. Figley CR, Roop RG. *Compassion fatigue in the animal care community*. Washington, DC: The Humane Society Press, 2006.
8. Marton B, Kilbane T, Nelson-Becker H. Exploring the loss and disenfranchised grief of animal care workers. Death Stud. 2020;44(1):31-41. doi: 10.1080/07481187.2018.1519610. Epub 2019 Jan 18. PMID: 30654733.
9. Mathieu, F. *The compassion fatigue workbook: Creative tools for transforming compassion fatigue and vicarious traumatization.* Routledge, 2012.

10. Moss, Jennifer. *The Burnout Epidemic: The Rise of Chronic Stress and How We Can Fix It*. Harvard Business Review Press, 2021.
11. Nguyen-Finn, Kim L. *Cost of caring: The effects of euthanasia on animal shelter workers.* The University of Texas Rio Grande Valley, 2018.
12. Rogelberg SG, Reeve CL, Spitzmüller C, et al. Impact of euthanasia rates, euthanasia practices, and human resource practices on employee turnover in animal shelters. *J Am Vet Med Assoc* 2007;230:713–719.
13. Rogelberg SG, DiGiacomo NA, Reeve CL, et al. What shelters can do about euthanasia-related stress: an examination of recommendations from those on the front line. *J Appl Anim Welf Sci* 2007;10:331–347.
14. Singer, T., & Klimecki, O. Empathy and compassion. *Current Biology,* 2014; 24(18), R875-R878.

CHAPTER 14

Owner-Intended Euthanasia

The need for shelter euthanasia is correlated with a societal need for access to care, including affordability, availability, accessibility, accommodation and acceptability. The lack of access to care has created a significant need for shelters to provide euthanasia processes to the public. This puts additional stress on CETs and requires an additional level of emotional intelligence to interface with people seeking owner intended euthanasia services (OIE).

The need for OIE services is profiled in the community services requests reported to Shelter Animals Count by 651 shelters in December of 2024. During that year, shelters provided approximately 674,000 individual community-based services, including owner intended euthanasia services, as well as food pantry, wellness care and spay/neuter services. Owner intended euthanasia refers to the euthanasia of animals at the request of their owners, generally prompted by behavioral concerns or medical diagnoses that compromise the animal's quality of life.

IMPORTANT NOTE: OIE accounted for over 43,000 euthanasia procedures or 6.4% of the total community services sought in 2024.



Initial OIE intake
(courtesy Genesee County Animal Control: Flint, MI)

Looking at another example, in some states, it is mandated that shelters annually report intake and outcome results, including shelter animal euthanasia and owner intended euthanasia. Reviewing the state reports shows how important shelter provided euthanasia services are to the public. For example, in 2021 in Michigan, approximately 8,000 dogs and cats (<6%) were euthanized in the 260+ registered shelters across the state. During that same period, an additional 8,700 dogs were euthanized at the owner's request. This illustrates that the shift in the population of animals who are euthanized in shelters has been towards OIE. The need for shelters to provide euthanasia services is likely to continue, and shelters should develop a plan to deal with the demand.

Clearly the public demand for euthanasia services has impacted the shelter world. In some areas of the country, shelters are recognizing that their euthanasia services are oriented more towards community needs instead of shelter needs. Unfortunately, some shelters are confronted with community needs that they may not be prepared to address. Shelters may find themselves in situations where a person presents to the front desk and is forced to discuss the request for euthanasia services in the lobby with no space for a private conversation. Ideally, shelters have cubicles or a small room where the pet owner can be ushered to where there is an opportunity to discuss the euthanasia decision.

Privacy allows for dignity for the owner and the staff member during the discussion of the process and allows the pet's owner to have the opportunity to express grief and say goodbye to their companion. Ideally, the shelter would have the ability to allow the pet owner to stay for the delivery of pre-euthanasia drugs, and potentially the euthanasia process, if they desire.

Shelters providing owner intended euthanasia must have an established standard operating procedure (SOP). Owner-intended euthanasia in shelters should follow the *14 Essential Components of Companion Animal Euthanasia*, outlined by Dr. Kathleen Cooney, which uses the algorithm Good Euthanasia and is listed in the table below:

G	Grief support materials provided
O	Outline caregiver and pet preferences
O	Offer privacy before and after death
D	Deliver proper technique
E	Establish rapport
U	Use pre-euthanasia sedation or anesthesia
T	Thorough, complete consent
H	Helpful and compassionate personnel
A	Adequate Time
N	Narrate the process
A	Avoid pain and anxiety
S	Safe space to gather
I	Inclusion of loved ones
A	Assistance with body care

Good Euthanasia, K. Cooney, CAETA
academy.royalcanin.com/en/veterinary/how-i-approach-a-meaningful-euthanasia-appointment

IMPORTANT NOTE: Access to care, particularly affordability, has pressed shelters more and more into offering community services.

Clearly, as shelters transition into OIE service, shelter staff with the interpersonal skills to work with OIE requests must be identified. Advanced training may be indicated to help staff develop emotional intelligence and the skill set to convey empathy and act with confidence. Not only is emotional intelligence required, but also preplanning and communication skills are necessary for OIE.

Preplanning and communication are cornerstones for shelter OIE. This begins before the human and animal ever arrive at the shelter. The shelter should post information on their website about euthanasia services. The post should include information about scheduling appointments, whether staying with the animal is an option and what the costs will be for the service. The same information should be provided as a script, that can be used when communicating with the public by phone or in person. This allows for the shelter personnel to be prepared for euthanasia, including having appropriate personnel available to facilitate paperwork completion and discuss what will happen during the euthanasia process.

In addition to eliminating the need to wait in the shelter lobby, scheduled appointments allow for euthanasia technicians who are willing to work with public animals, have good communication skills and can be supportive of the owner to be available to perform the service.

At the time of the scheduled euthanasia appointment; the pet and pet owner should be moved into a separate area where the staff member should triage the euthanasia decision and confirm that there are no other options that can be offered. All paperwork should be completed. The euthanasia process should be explained, including whether there is an option to be with the pet for part or all of the process. Body aftercare also needs to be discussed.

Once the euthanasia process has been explained and any questions answered, the pet owner should be allowed to say goodbye if they are not staying for the procedure. If the owner is going to be present for euthanasia, the CET must also explain postmortem changes such as agonal breathing, muscle twitching, urination and defecation, and the lack of eye closure. After confirmation of death, they should allow the owner some private time to say goodbye.

Owner-Intended Euthanasia
Identify owner-intended euthanasia
Move human and animal to a separate area for privacy
Discuss decision and rule out all other options other than euthanasia
Confirm ownership
Complete paperwork
Discuss process
Discuss body after care

Clearly it takes a CET with special skills and a willingness to work with public members who are seeking OIE. The shelter should consider additional training for personnel who will be working with the public in this capacity. Staff should be rotated frequently to reduce compassion fatigue, and debriefing needs to be a regular occurrence. Finally, staff participation must be voluntary, not mandatory.

Shelters providing OIE may opt to have two euthanasia areas in their facility. There should be a dedicated euthanasia room for shelter animals as described. Ideally, there would also be a “comfort room“ like the rooms used for euthanasia in private veterinary practices. The room should be located where humans and animals can be ushered to for the euthanasia discussion and possibly, the process. This room would be near the intake area of the shelter and would have a private exit where the owner may leave the facility without having to exit into the public lobby.

CHAPTER 15

Euthanasia for Animals Other Than Dogs & Cats

Many organizations find themselves caring for animals other than dogs and cats, and at times these animals must be euthanized. Ensuring that this process is as humane as possible for each individual animal, regardless of species, is just as critical as it is for dogs and cats.

IMPORTANT NOTE: The species-specific guidelines noted here are intended to complement the basic euthanasia information. They are not intended to serve as a substitute for thorough knowledge of, experience with, and training regarding, the behavior and physical characteristics of each species. CETs should not attempt to handle species with which they are not familiar and comfortable.

Small Mammals

All small mammals have sharp teeth and are capable of biting when startled or in pain. They are also capable of moving very quickly, and can injure themselves or even become lost in the shelter if not handled properly. Care must be taken to ensure that each individual is handled and euthanized humanely. Whenever handling small animals for euthanasia, the CET should try to make them feel as physically secure and comfortable as possible. Use towels to securely wrap rabbits, for example, and "scoop" smaller animals like mice in the palm of the hand. Never grab small animals by the tail or the ears, and ensure that their bodies are fully supported at all times. Gloves can be useful to help avoid bites that break the skin, but they are not a substitute for calm, careful handling.

Rabbits

Although rabbits should be euthanized with sodium pentobarbital in the same manner described earlier for cats and dogs, because of their high metabolism they require fully twice the amount of drugs. For IV injection, therefore, at least 2 ml of sodium pentobarbital should be used per 10 lbs of animal, and for IP injection 6 ml is the minimum recommended. Both PreMix and tiletamine/zolazepam are acceptable pre-euthanasia drugs for rabbits.

Small Rodents (Mice, Rats, Hamsters, Gerbils, etc.)

Because it is nearly impossible to inject into the veins of most small rodents like mice, rats, gerbils and hamsters, the most effective mode of administration of euthanasia drugs is by IP injection. Gently grasp the animal's back and neck from the top. For some small animals the CET can gently "scruff" the nape of the neck while holding the animal in the palm. Inject into the midline. If the animal cannot be gently and securely handled, or if handling would cause the animal undue stress, the technician should either administer a pre-euthanasia anesthetic (e.g., tiletamine/zolazepam, Premix) or use an inhalant anesthetic (e.g., isoflurane) to render the animal unconscious before injecting the drug IP.

Guinea Pigs

Guinea pigs should be euthanized with sodium pentobarbital in the same manner described previously for cats and dogs, typically using IP injection because of their tiny veins. Both PreMix and tiletamine/zolazepam are acceptable pre-euthanasia drugs.

Ferrets

Like cats, ferrets react quickly in their attempts at escape from unfamiliar handling, and caution should be used when handling even tame ferrets. Ferrets can be restrained for euthanasia either by wrapping them securely in a towel or by scruffing the body for IP injection, similar to a cat. If the ferret can be handled, direct IP administration of sodium pentobarbital is the most effective means of euthanasia. If not, either PreMix or tiletamine/zolazepam are acceptable pre-euthanasia anesthetics.

Birds

Birds are generally more susceptible to stress than any other group of animals, and even small birds like parakeets, canaries and other songbirds can deliver painful bites. Regardless of the bird's type or size, care must be taken to ensure that their stress levels are reduced to the greatest extent possible both for the animal's comfort and human safety.

Small birds can generally be handled using a soft washcloth or towel. Gently cover the bird, then grasp them gently from behind, placing the bird's head between the first and second fingers and cupping the bird's body in the palm of the hand. Chickens and other larger birds can be restrained using larger towels to wrap and restrain the head and wings. Gloves and eye goggles are highly recommended when working with any of the larger bird species, from fish-eating birds to raptors, as both their sharp beaks and their talons may inflict serious injury.

Small birds can be anesthetized prior to euthanasia using an inhalant anesthetic such as isoflurane; larger birds should be administered an injection of PreMix or tiletamine/zolazepam into the muscle mass overlying the breastbone or at the back of the thigh. Once the bird is unconscious, injection of sodium pentobarbital can proceed. Even though birds do not have a true peritoneal cavity like mammals, sodium pentobarbital can be injected into the body cavity directly below the keel, or breastbone, perpendicular to the body. Alternatively, IV injection can be performed directly into the veins running along the wings. For CETs experienced with feeding birds, oral administration of sodium pentobarbital may be yet another option (assuming oral administration is permitted by law); using a curved dosing needle the drug can be simply squirted into the bird's mouth, but care must be taken to ensure that the drug is not accidentally introduced into the trachea where it will cause suffocation.

Very large birds like raptors and ratites (ostriches and emus) are dangerous, and euthanasia should not be attempted without skilled assistance.



Proper site for injection of bird

Reptiles

Reptiles have physiological differences that pose unique challenges for euthanasia. Reptiles in general have a much slower metabolic rate than either mammals or birds, requiring a longer time for euthanasia drugs to achieve their desired effect. Moreover, many of these animals can appear to be lifeless while just lying dormant, making verification of death extremely difficult. For these reasons, it is particularly important that a CET not attempt euthanasia of reptiles unless they have considerable experience with the species in question.

Technically speaking, most reptiles' breathing, and heart rate can be monitored in much the same way as one would monitor a mammal or bird. Respirations can be seen as the chest and abdomen move in and out, and the heart may be seen beating if the animal (particularly lizards and snakes) is examined from the bottom. However, all reptiles can survive with an extremely low heart rate and respiratory rate, especially if the body is chilled. Mistakes can be made, therefore, if the CET relies on visual observation alone to make a conclusion about death. Moreover, while the intracardiac methods of euthanasia are technically possible, the technique can be very difficult to perform on reptiles, particularly when the animal has a plastron (shell) that blocks access to the heart. For these animals, best practice is to leave the body at room temperature overnight (whenever relying on rigor mortis to verify death it is best to cover the animal with a towel). Within twelve hours, the eyes should be dull and sunken, and the limbs, head, and neck should be limp (or extremely stiff, if the cycle of rigor mortis is incomplete); if this isn't the case, the animal may not actually be dead, and additional sodium pentobarbital should be administered.

All reptiles can be euthanized using a three-step process: 1) Administer PreMix or tiletamine/zolazepam at a dosage of four times that recommended for dogs and cats (2ml/10 lbs. instead of .5 ml/10 lbs), then return them to their enclosure until they become limp; 2) Administer sodium pentobarbital either through IC, IV or the abdominal cavity; 3) Finally, the brain should be physically disrupted by pithing. Pithing is a procedure that involves inserting a needle to destroy the brain and/or spinal cord, resulting in death.

> Always wear gloves when handling reptiles and wash hands thoroughly after, as they can be carriers of salmonella and other pathogens.

Snakes

Although most snakes are harmless, any snake who cannot readily be identified should be regarded as potentially dangerous. Some snakes can injure or kill people with their venom or constricting ability, so only an expert and experienced handler should handle large and/or poisonous snakes. A Plexiglas or heavy-wire screen barrier may be used to approach and capture nonpoisonous snakes, and specifically-designed snake handling tools (hooks and gloves) should be used to increase handler safety. Appropriate restraint involves control of the head (grasp immediately behind the head) plus adequate support of the body (generally there should be one handler for every five feet of snake).

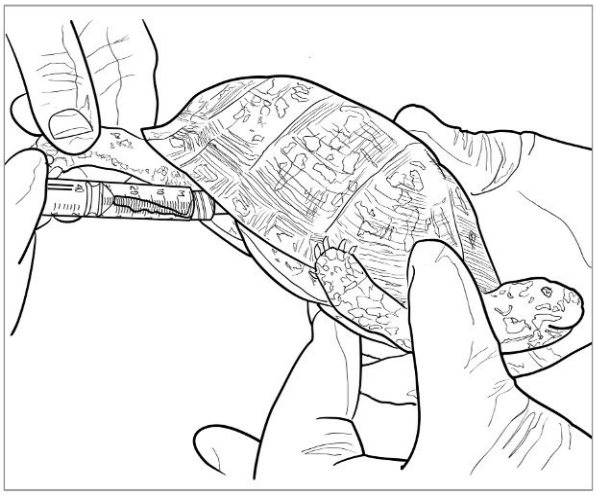
Snakes can be euthanized either by direct injection or with the use of a pre-euthanasia anesthetic. If using tiletamine/zolazepam or PreMix as a pre-euthanasia anesthetic, inject into the muscle along the backbone. Once the snake is unconscious, an IC injection of sodium pentobarbital may be given; the heart of a snake can be located by visually observing the heartbeat in between the first and second thirds of the underside of the body. Alternatively, IV injection into the ventral (tail) vein is an option. Direct injection into the coelomic cavity (body cavity space similar to IP cavity) can also be performed. Whenever injecting snakes be sure to use a small gauge needle and inject under the animal's scales. Do not try and push the needle through the scales. Pith the snake to complete the euthanasia process.

Turtles, Tortoises and Terrapins

All turtles, tortoises and terrapins (all collectively referred to in this section as turtles) can bite and strike with surprising speed, and some species, such as snapping turtles, are dangerous and can inflict serious injury. Turtles can also be difficult to restrain due to their strength and protective shell.

Turtles may be given pre-euthanasia drugs like tiletamine/zolazepam or Premix. Sodium pentobarbital may be given IV or IC. An IC injection can be given at the thoracic inlet which is found between the neck and the shoulder. Turtles can be given IV injections in the jugular or the ventral tail vein. Complete the euthanasia process by physically disrupting (pithing) the brain.

To inject a turtle it is necessary for the head and limbs to be extended. This can pose quite a challenge, particularly because some species can draw their head and legs fully into their shells and then close the hinged shells completely over these appendages. Trying to force a limb out of a shell will only increase the animal's stress level and may result in a painful bite. Better practice is to simply place the animal on flat surface until the head and tail reemerge, then quickly grasp a limb before it can be retracted again. Most hard-shell species cannot hinge their shells closed if a limb is extended. To safely work with a front leg, use a towel or other soft cloth to gently press the turtle's head to the side and hold it safely out of biting range. For larger species, the head can be restrained by gently placing an object such as a coffee can or a toilet plunger over their heads and pressing it in towards the shell.



A pre-euthanasia anesthetic can be injected into the rear leg of a turtle

Crocodilians (Alligators and Crocodiles)

The jaws, feet, and tail of crocodilians are extremely dangerous. Only experienced handlers should attempt to restrain a crocodilian who has not been chemically restrained, so professional expertise from qualified zoo or wildlife personnel will be needed. If PreMix or tiletamine/zolazepam is to be used for pre-euthanasia anesthesia, it should be administered via a pole syringe into the muscle mass at the base of the tail or top of the rear leg. Once the animal is unconscious, an IV injection into the jugular or ventral (bottom) tail vein is preferred. Remember, this is a cold blooded creature, and physical disruption of the brain is recommended to complete euthanasia.

IMPORTANT NOTE: If the animal is over four-feet long, and must be euthanized outside the shelter environment, safety may dictate that they be euthanized by gunshot rather than by injection.

Lizards

Larger lizards are potentially dangerous due to sharp claws and teeth, and strong tails. In addition, a few species are venomous. It is prudent to always wear gloves when handling lizards. Appropriate restraint involves control of the head (grasp the neck area above the shoulders and behind the jaw) and the tail (grasp the base of the tail, right next to the body, for most effective control).

Pre-euthanasia anesthetic is preferred to minimize the stress of handling and to increase the safety of the handler. Following unconsciousness, an IV injection into the jugular or ventral (bottom) tail vein may be given. An IC injection may be made directly into the heart only if the animal is unconscious. The heart can be accessed from the underside of the lizard's body and is found between the front and middle thirds of the body. The heart may be located by visualizing its beating, with a stethoscope, or by feeling the pulse with a finger or the palm of the hand. Complete the euthanasia process with physical disruption of the brain (pithing).

Fish

Fish euthanasia is very challenging. In the past, immersion in tricaine (a fish anesthetic) or MS 222 has had mixed results in causing death to zebrafish, according to the *AVMA Guidelines for the Euthanasia of Animals: 2020 Edition*. Rapid chilling (2-4° C) followed by an additional means of euthanasia is conditionally acceptable for tropical and subtropical fish.

To euthanize fish in the shelter setting, consider injecting sodium pentobarbital into the coelom (ICo or abdominal injection). It has been reported that 6 ml of sodium pentobarbital dissolved into a quart of water is an effective fish euthanasia technique. Physical disruption of the brain should be completed as a final step when euthanizing a fish.

Amphibians

Amphibians (toads, frogs) can be difficult to handle due to the slippery protective mucous layer coating their skin. Many amphibians also have skin glands, generally located toward the back and to the side of the head, which exude a toxic substance under stress. Latex gloves are recommended for any staff who will be handling any amphibians.

Euthanasia can be achieved by injecting pre-euthanasia drugs into the thigh muscle. The animal should be kept in a warm, dark, quiet place while waiting for the drug to take effect. Sodium pentobarbital is then administered by the ICo (intracoelomic-into the abdomen of a species without a diaphragm) route. The euthanasia process is completed by physical disruption (pithing) of the brain.

The notion that fish, reptiles, and amphibians can be euthanized simply by placing them in a freezer is false. The *AVMA Guidelines for the Euthanasia of Animals: 2020 Edition* state:

> *Immobilization of reptiles by cooling is considered inappropriate and inhumane even if combined with other physical or chemical methods of euthanasia. Formation of ice crystals on the skin and in tissues of an animal may cause pain and distress.*

Large Domestic Mammals

Large mammals (horses, cows, etc.) have the potential to inflict grave injury if they are improperly handled. Most people are aware that horses, for example, can both bite and kick, but CETs must also be aware that certain drugs can increase the chances that the animal will react violently. Moreover, large animals injected with euthanasia drugs can drop to the ground quickly, and anyone caught in the path of a falling half-ton animal is liable to be seriously injured. For these reasons, unless the CET and handlers are experienced both in handling large animals and euthanizing them, they should defer to the expertise of a large animal veterinarian.

Equines (Horses, Donkeys, Mules)

Equines can be euthanized by direct injection of sodium pentobarbital into the jugular vein. However, because of the large quantities of drug required to achieve euthanasia (technically speaking, a 1,000 lb horse requires 100 ml of sodium pentobarbital, although the manufacturer indicates that there is a "dose ceiling" of about 60 ml, after which little further effect is really achieved), the animal is likely to fall to the ground well before the full dosage of drug is administered, creating a situation that is potentially dangerous for the CET and handlers. A safer practice is to administer pre-euthanasia drugs to the animal. The drugs will take several minutes to achieve full effect. Xylazine is the typical pre-euthanasia drug used in equines and results in a 5-point standing sedation. This means all four feet and the nose are touching the ground.

When handling an equine for euthanasia, it is important to remember that the head of an equine is very heavy, and can cause serious injury when the animal falls. It is vital that there be at least one handler holding a lead rope on the animal's halter, and that they are prepared to help guide the animal's head to the ground when it falls, rather than just allowing the head to move unsecured. A common approach is to turn the head toward the animal's left (or "near") side (the one from which the handler traditionally mounts or leads the horse) and help push the horse down and back, away from the handler, as the horse starts to drop.

Ruminants (Cows, Goats, Sheep)

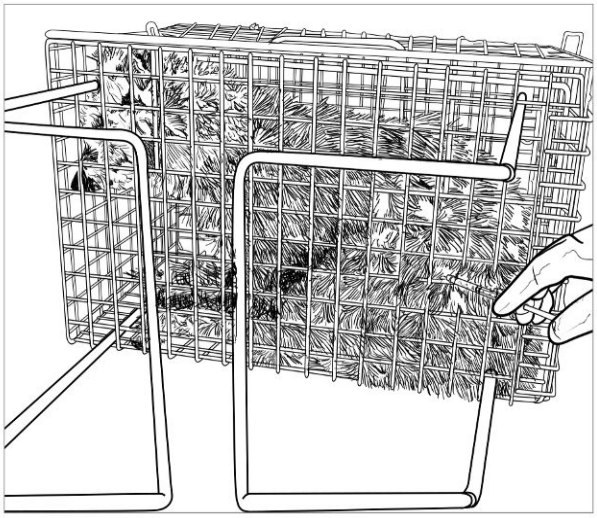
Cows and other split-hooved ruminants like goats and sheep are very sensitive to xylazine, making it the preferred choice for pre-euthanasia injection. Alternatively, if the animal is securely restrained in a chute, or if they are small enough to be held (and the confinement will not increase the animal's stress) direct injection of sodium pentobarbital into the jugular vein can be performed.

Pigs

Pre-euthanasia anesthetic is needed for most pigs since they are difficult to restrain and their veins are very deep and difficult to find. Pre-euthanasia drugs may include a combination of tiletamine/zolazepam combined with ketamine and xylazine. Delivery of sodium pentobarbital may be IV or IC, if the pig is unconscious. A 5 inch needle is needed for an adult pig. If a CET is experienced, they may be able to administer an IV dose (1 ml/10 lbs) of sodium pentobarbital into the large vein which is clearly visible in a pig's ear.

Wildlife

Unlike most domesticated animals, wild animals are easily stressed and threatened by contact with humans, whether that contact is direct or indirect. Just the presence of people nearby causes tremendous stress. This makes it virtually impossible to achieve a humane death for such animals. It also elevates concerns about employee safety. However, this is not an excuse to practice less-than-humane methods; instead, CETs must work that much harder to make the process as safe and stress-free as possible.



A squeeze cage is useful for securing wildlife for injection of pre-euthanasia drugs

In the shelter setting, the environment in which wildlife is held prior to euthanasia is of critical importance. The goal should be to provide as stress-free a setting for the animal as possible. To facilitate this, consider the following recommendations:

- Isolate as much as possible from sight and sounds of domestic animals.
- Choose a location away from high-traffic areas.
- Restrict staff access to holding areas or places where wild animals might be held.
- If possible, dim the lights in the area.
- Maintain as quiet a setting as possible.
- Restrict the animal's ability to see what is going on around them by covering their container with towels or blankets.
- Ensure that euthanasia is performed as quickly as possible.

Contrary to popular belief, North American porcupines are not able to project their quills. They can flip their tails and slap the quills into anything the tail touches.

Skunks are capable of projecting spray up to 13 feet. Cover their cage/trap with a towel and move as slowly as possible to limit their stress and reduce their chances of spraying.

The principles of euthanasia of wild mammals are the same as they are for cats and dogs. However, administration of pre-euthanasia drugs resulting in unconsciousness should be considered mandatory to alleviate the animal's stress as quickly as possible. Oral administration of sodium pentobarbital is an option if the animal is already in a trap or cage, and if the stress level can be reduced sufficiently that it will eat. Mix the drug in canned dog or cat food, carefully place it within the animal's reach and leave the vicinity until the animal has lost consciousness. If the animal, too stressed or injured to eat, direct IM injection of pre-euthanasia drugs will be required. To restrain the animal for administration of pre-euthanasia drugs, ensure that he or she is safely confined in a cage, carrier or trap, and use a trap fork, heavy blanket, or other method to safely press it into position for IM injection into a muscle mass. Control poles should not be used on wild animals unless the loop of the pole is placed around one of the animal's front legs and the neck to prevent strangulation.

The perceived elevated threat posed by handling wild animals is often used to justify the use of less humane euthanasia methods like gas chambers. However, if CETs are well trained in safe handling techniques, there is no reason that traditional EBI cannot be used for all wildlife species.

Bats

Bats should be considered potentially dangerous because they bite readily and are a primary carrier of rabies. If possible, avoid direct handling of bats by using nets and other restraint devices. If the bat must be handled, wear leather gloves, and use a thick cloth or towel to restrain the wings and legs of the animal.

A CET can use an inhalant anesthetic such as isoflurane to render the animal unconscious, followed by an IC or IP dose of sodium pentobarbital. Alternatively, the CET can immobilize the bat in a net, grasp him or her gently but firmly with gloved hands, and administer an IP injection with a very small gauge needle.

Deer, Elk, and Other Large Hooved Animals

Extreme caution must be exercised when handling large, hooved animals, since most adult deer, elk, moose, etc., may inflict grave injury with a single kick. Antlers can also be used effectively as weapons. Males will be particularly excitable and likely to behave aggressively during the fall breeding season. Administration of a pre-euthanasia drug like PreMix will be required for such animals, followed by injection of sodium pentobarbital. Alternatively, outside the shelter environment the animal may have to be humanely euthanized by gunshot if drugs cannot be safely administered.

Bears, Coyotes, Mountain Lions, Primates, and Other Large Mammals

Even if large carnivores are not native to your community, there is the potential that a captive animal (being housed in a small zoo or by a private owner) may escape and be injured by a passing car or otherwise require euthanasia. Contact your local state or federal wildlife authority to assess which animals are likely to be housed in your area (based on local permits issued, etc.) and to develop a plan for handling potential incidents.

> While a good recommendation for all animal care workers, pre-exposure rabies vaccinations should be a requirement for anyone who may come into contact with rabies-vector species, including CETs.

Field Euthanasia

In most cases, animals picked up by an officer or humane agent are transported to the shelter facility or directly to a local veterinary office. However, there are situations that may make transport impossible, and require euthanasia to be performed on site (this is commonly referred to as “field euthanasia”). This most often occurs when the animal is so gravely ill or injured that it is likely to suffer a painful death during transport. The ill or injured animal is so large that it cannot be reasonably transported even to a nearby facility; or there are other extenuating circumstances that make transport of individual animals unreasonable (e.g., when a truck full of livestock is involved in a traffic accident and dozens of mortally wounded animals are spread out along the roadway). Regardless of the circumstances, it is critical that every animal receives a humane death.

Just as is the case with in-shelter euthanasia, field euthanasia must follow policies and procedures established by each organization. Field euthanasia policies should include, but not be limited to, guidance regarding:

- What approvals will be necessary to authorize field euthanasia? (Will a veterinary recommendation be required for all animals or only for companion animals like cats and dogs?)
- What state and local laws apply to emergency euthanasia situations?
- Whether euthanasia drugs are permitted to be taken out of the shelter facility, and if so how they will be stored and managed?
- What types of firearms will be permitted for field euthanasia, and how they will be utilized?

- What methods of euthanasia will be permitted?
- What steps must be taken to minimize agency liability?
- What notifications, if any, of local law enforcement must be made (particularly if firearms are to be discharged)?
- How should the presence of members of the public impact euthanasia decisions and methods?

Assuming all policy issues have been addressed and field euthanasia will proceed, the officer, must determine the appropriate method of euthanasia. This decision must be made based on a careful weighing of factors, including the type of animal(s) involved, the condition of the animal(s), the potential risks involved to the officer and to public safety, and the public perception of the method selected. To complicate matters further, these situations invariably occur under less than ideal conditions, including darkness, poor weather conditions, and sometimes, even in dangerous locations. Nevertheless, ensuring the most humane euthanasia possible for the animal(s) must always be of paramount importance.

Special care must be taken when field euthanasia of ill or injured domestic animals is required, particularly when they are wearing a collar with identification tags. The facility's field euthanasia policy must be expressly clear about any and all procedures required, including documentation to be provided, approvals that must be obtained, witness statements that must be taken, etc., to avoid potential liability.

Typically, in a field situation an officer must choose between euthanasia with sodium pentobarbital (EBI) and gunshot (gunshot is only appropriate in field situations; it should never be used in a shelter environment). Technically speaking, either method is potentially available for any type of animal. However, generally speaking EBI is preferred for smaller animals where the officer can safely come into close proximity to the animal, and gunshot is more preferred for larger animals and situations where direct handling is not a possibility.

Confinement for Field Euthanasia

Regardless of what euthanasia method is selected, the animal must first be sufficiently controlled. Obviously, injection of euthanasia drugs requires direct handling of the animal. However, even gunshot requires precise targeting to ensure that death is instantaneous. In many cases, the animal will already be recumbent or have its movement restricted. Some animals will need to be humanely confined and restrained in order to carry out safe and effective euthanasia. The officer must therefore have a variety of humane confinement methods available, including blankets, nets, traps, ropes, halters and even chemical immobilization methods like injection poles and darts.

No matter what type of animal is involved, it is always best to attempt to steer the animal into a pen or enclosure that allows the animal to remain on their feet but prevents them from moving backwards or forwards or turning around. For smaller animals, cages and carriers are the most typical options; for larger animals, boards, fencing, and gates may be used to create a makeshift enclosure. If confinement is not an option, the officer will have to use a rope noose or plastic-coated cable wire to contain the animal. Horses, cattle, sheep and other livestock can have makeshift halters placed over their neck and head to control their forward and backward motion. For pigs, place the noose over their upper jaw, behind their canine teeth. Remember, animals are generally much more powerful than humans, and animals in pain and fear can be especially dangerous. Wild animals such as deer pose unique challenges in that even the smallest can inflict grave injury. Officers must take extreme precautions to keep themselves and the public safe when attempting to confine or restrain any animal, and should never attempt to do so without the help of a trained assistant.

Field Euthanasia by Injection of Sodium Pentobarbital

Assuming the animal has been safely secured, the ideal means of euthanasia even in field settings is injection of sodium pentobarbital after administration of a pre-euthanasia drug, as described in this manual. Any officer performing field injection must take extra precautions to ensure that the animal is properly and safely handled, as the extra stress of the uncontrolled field environment combined with whatever trauma the animal has suffered will cause many animals to react violently.

> Bear in mind that the conditions in which the animal is found can influence which method of euthanasia is most appropriate. CETs in the field must be well-versed in all of the humane options available.

Some state laws prohibit euthanasia drugs from being carried in vehicles or require direct supervision of such drugs by a licensed veterinarian when off shelter property. Officers should check with their state officials to find out the legal requirements for their jurisdictions. If drugs can be carried, maintaining the same security for controlled substances in the vehicle as in the shelter is crucial. Bolting a combination or keyed metal lock box to the floor of the vehicle behind or under the seat, out of sight, provides security for carrying a small amount of controlled substances. Procedures generally recommended are to maintain the supply of controlled drugs in a safe at the shelter, check out the necessary drugs at the beginning of the shift, and then log and return the drugs at the end of the shift. No controlled substances should ever be left in an unattended vehicle overnight.

Field Euthanasia By Gunshot

While EBI is preferred, there are circumstances in which it is simply not an option (for example, if an animal is so large and fractious that attempting chemical capture is impossible). In such limited cases, a properly trained officer may elect to dispatch the animal by gunshot, provided they are: a) trained and certified in the use of the weapon; b) certain that the discharge of the firearm will pose no threat to the public; and c) confident that they will hit the exact spot necessary to ensure that the animal dies instantaneously without enduring further suffering.

No officer should attempt field euthanasia without all appropriate certifications and training. Field euthanasia tests the skills of the most experienced officers, and should not be attempted unless the officer is confident that it will be achieved safely and humanely. If in doubt, the officer should call in a professional better able to manage the situation, be it a more experienced officer, a veterinarian, or even a law enforcement officer with more experience handling such high stress circumstances. Calling in "backup" is not a sign of weakness or failure—it is recognition that such situations must be handled with the utmost care and professionalism.

Types of Weapons

Rifles

Because a rifle is capable of driving a bullet at a greater velocity than other weapons, significantly increasing the risk of ricochet and injury to onlookers, the use of rifles for field euthanasia is not recommended. A rifle should only be used as a last resort in cases where an injured animal cannot be approached, but where an expert marksman can nevertheless target the exact spot necessary for humane death.

Handguns

General-purpose handguns can be used to kill animals humanely, provided: a) the muzzle of the gun must never be placed in direct contact with the animal's head. Instead, the officer should shoot from a distance of approximately two inches and aim down the length of the neck into the main bulk of the body; and b) the officer must use round-nose lead bullets to facilitate proper penetration; the use of target-shooting ammunition is unacceptable.

Shotguns

Used properly, shotguns are the best choice for field euthanasia by gunshot because they are much safer than handguns or rifles and are equally effective. For all species, a 12-, 16-; or 20-bore shotgun may be used with number 4, 5; or 6 birdshot. A 28-bore or a .410 can be used if nothing larger is available, but should not be used on mature bulls or large pigs. As with handguns, the muzzle should never be placed in direct contact with the animal's head. Instead, the muzzle should be held 2–10 inches from the animal's forehead, aiming down the line of the neck into the main bulk of the body.

Ordinary-sized birdshot is capable of inflicting massive injuries when it initially strikes the skull as one compact mass, giving it considerable initial penetrating power. Once inside the skull, the pellets will separate and disperse within the brain cavity, effectively destroying the brain and killing the animal. Further, a shotgun is usually more readily available than firearms that use single bullets.

IMPORTANT NOTE: Particularly when using a rifle type weapon, it is important that a suitable backstop be found to block the bullet if it exits the body or if the target is missed. Suitable backstops include manure heaps, hay or straw stacks, and earthen banks. There should be no "dead ground" (hidden dips) between the target and the backstop from which people, vehicles, or other animals could suddenly appear. If no backstop is available, the area behind the target must be clear of roads and dwellings for a distance of approximately 3,000 yards. (A bullet from a .32 caliber handgun can ricochet and travel in excess of 2,000 yards.) In such a circumstance, everyone in the vicinity must stand behind the officer, who should aim the shot down the spine and into the body of the animal.

Officers should assume that any ill animal they encounter may have been exposed to rabies, and should handle them with extreme caution. They should also be mindful that because rabies testing requires the dissection of the brain, if the animal must be submitted for rabies testing it should not be euthanized by gunshot.

To be considered humane euthanasia, a gunshot must be administered in such a manner as to achieve death instantaneously. To do this, the bullet must destroy the brain stem; the portion of the brain that controls vital functions like breathing; achieving loss of pain and loss of consciousness at the same moment it causes loss of life. Hitting the brainstem requires precise positioning of the bullet, and this position varies from species to species; therefore, officers must be thoroughly trained on the precise location required to effect humane euthanasia by gunshot for each type of animal they may encounter in a field euthanasia situation.

IMPORTANT NOTE: All firearms must be discharged at close range into the brain. The muzzle of the firearm; however, should never come in contact with the animal's head; such placement could result in a burst gun barrel and severe injury to the officer.

When an animal is properly shot, they will collapse immediately and stop breathing, and all vocalizations will cease. They will also exhibit physical reactions that may be disconcerting to the untrained observer. The animal will bleed profusely from the entry wound, mouth, and/or nose. There may be exaggerated contraction of the muscles. The eyes will assume a fixed, glazed expression; the body may start to twitch and in some cases convulse quite violently (particularly in the case of pigs) for a minute or longer. While disturbing to see, these are all to be expected even if the animal has been successfully euthanized by gunshot. To confirm that the animal is dead, the officer should verify the lack of rhythmic breathing and lack of blink reflex; if in doubt, the animal should be promptly shot a second time.

Any officer that carries firearms as a possible means of euthanasia must strictly observe all general firearms safety rules, including:

- All firearms must be handled as if they were loaded at all times.
- Officers must never engage in behavior that may result in an accidental discharge while holding a firearm, such as climbing fences, etc.
- Firearms must never be carried in a pocket or waistband; a pistol case or gun holster with a safety flap or strap must always be used.
- No firearm, loaded or unloaded, should ever be pointed at anything not intended as a target.
- A loaded firearm should never be left unattended or carried in a vehicle.

Correct Shot Location By Species

Cattle

A cow's brain is situated high in the head. The ideal point of penetration is in the middle of the forehead, at the crossing point of two imaginary lines drawn from the middle of each eye to the base of the opposite horn. This should put the target about two inches above a line drawn across the forehead at the back of the eyes. The shot should enter at a right angle (90 degrees) to the skull. For a calf, the upper portion of the brain is not yet developed, so the firearm should be aimed at a point slightly lower than that in the adult animal, and it should be tilted back to obtain the correct angle for the shot to destroy the brain stem.

IMPORTANT NOTE: While the target location remains the same, mature bulls may have a hard, thick frontal bone, often covered in dense, matted hair, which can be difficult to penetrate with a small caliber weapon; for these animals a shotgun is a better option.

Deer

A deer's brain is situated high in the head. For the purposes of determining the ideal aiming point, the antlers are not comparable to the horns on cattle. Instead, the ideal aiming point is in the middle of the forehead, at the crossing point of two imaginary lines drawn from the middle of each eye to the top of the opposite ear. In stags, this spot is found between the antlers. The angle of the shot should be through the brainstem, as in cattle.

Horses and Other Equines

A horse's brain is situated high in the head. The shot should be aimed in the middle of the forehead, but slightly higher than the aiming point in cattle. Two imaginary lines should be drawn from the middle of each eye to the base of the opposite ear; the aiming point should be approximately three-quarters of an inch above the point where they cross. The muzzle of the firearm should be tilted slightly upward or downward so that the shot is directed through the cerebral cortex towards the brainstem. If a horse is holding their head in a lower than normal position, care should be taken to adjust the angle of the shot.

Sheep and Goats

For sheep and goats, the aiming point is in the midline, just above the eyes, with the shot directed down the line of the spine and into the bulk of the body. This can be difficult to achieve. A slight error in the angle of the shot or small movement by the animal can result in a free bullet exiting the animal's throat or neck. To prevent this, the animal's head must be in the normal position before shooting.

Pigs

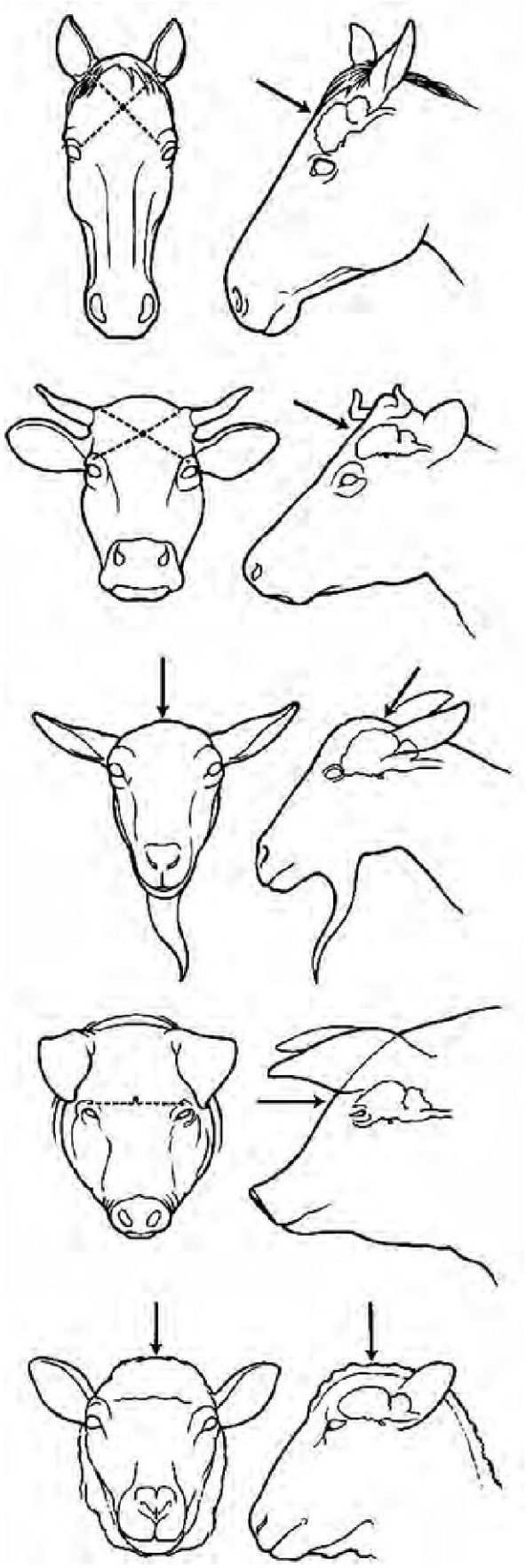
Pigs are among the most difficult animals to shoot. The target area is very small, and some pigs are "dish-faced" due to age or breed characteristics. The brain lies quite deep in the head with a mass of sinuses lying between the frontal bone and brain cavity. The ideal site for shooting pigs is one finger's width above eye level, on the mid-line of the forehead, aiming towards the tail.

Older pigs and exotic breeds, such as the Vietnamese pot-bellied pig, often have a deep, bony mass on the forehead, which can cause problems when using a free-bullet weapon. The bullet can become lodged in the sinuses and fail to penetrate the brain. Some older pigs, especially boars, have a ridge running down the center of the forehead. In such cases the muzzle of the gun should be placed slightly to one side of the ridge aiming into the center of the head. Because of the problems that might occur with adult and exotic-breed pigs, a shotgun should be used if possible. If a shotgun is used, the shooting position is the same. The animal can also be shot from behind the ear aiming towards the middle of the head.

Disposal

Once euthanized, arrangements must be made to have the animal's body removed from the scene. Small animals can be transported back to the shelter for routine disposal. Larger bodies may need special accommodations, such as a rendering company. Remember that an animal who has received drugs, including euthanasia and pre-euthanasia drugs, CANNOT be rendered due to potential contamination of feed additives.

IMPORTANT NOTE: If a large animal such as a horse is euthanized in a confined space, like a stall or pen, the body should be removed from the enclosure as soon as possible, since the onset of rigor mortis will make it very difficult to move later. If a body is to be buried, it must be at least 250 yards away from any well, borehole, or spring that supplies water for human consumption, and at least 30 yards away from any other spring or watercourse. Some jurisdictions prevent the burial of animal carcasses, so ensure that the means of disposal selected is lawful.



Angles and entry locations for correct shot locations for horses, cattle, goats, pigs and sheep

Mass Euthanasia

While a written euthanasia policy will ideally prescribe the proper procedures for virtually every euthanasia that must be performed in the shelter, there may be cases where it is necessary to euthanize large numbers of animals off-site, either due to their physical condition (e.g., several equines in such poor condition that they cannot be humanely transported) or due to the sheer number of animals involved (e.g., large-scale hoarding cases). In such cases, it is still critical to ensure that every animal is treated humanely.

Typically, in cases where immediate euthanasia off shelter property is necessary to end extreme suffering, the lead veterinarian on the scene, in consultation with the shelter official in charge, will determine which animals must be euthanized and what manner of euthanasia is most appropriate. Depending on the type and numbers of animals involved, EBI may not be considered practical or safe. Nevertheless, the number of animals involved or complexity of the situation should not be an excuse to permit inhumane practices to occur.

IMPORTANT NOTE: Even in cases of extreme suffering, minimum hold periods and other legalities may still apply; it is vital to ensure that all applicable legal mandates are followed, particularly if the animals are being seized as evidence of cruelty or another crime.

Removing euthanasia drugs from the shelter facility may be subject to state regulation. Obtain all necessary legal authorizations before taking drugs off-site. Typically, the veterinarian on-scene will be responsible for providing and overseeing the use of all drugs, and must ensure that proper recordkeeping requirements are met.

Depopulation

Shelter personnel may be commissioned to help with depopulation of a herd or flock of animals due to a disease outbreak (example avian influenza). The *AVMA Guidelines for the Depopulation of Animals: 2019 edition* is a resource for this procedure. An incident command system is established by federal agencies to manage the logistics of this process.

Staff Debriefing and After-Care

Depending on the nature of the mass euthanasia event and the number and type of animals involved, psychological debriefing of staff may be prudent. Shelter management should arrange for such debriefing to occur within 24 to 72 hours, and should determine whether staff attendance will be mandatory. Even if a formal debriefing is not arranged, any staff member involved in a mass euthanasia event should be allowed to request psychological assistance at any time, and arrangements to fulfill such requests should be made promptly.

Glossary

Adverse events: Unintended side effects or unplanned bad reactions to drugs. Some drugs have known side effects that a veterinarian might try to prevent by combining medications. Individual animals can react in unexpected ways to certain drugs or procedures with vomiting, seizures, sensitivity to sound, pain, vocalizing, or other negative side effects. Both the CET and the handler should be aware of the possibility of adverse reactions so you can be ready to react if a bad side effect happens. Adverse events should be noted in the medical record.

Analgesia: Pain relief, as in drugs used to reduce or prevent pain.

Anesthesia: A method used to produce unconsciousness. See Unconscious.

Aquamation: Also called alkaline hydrolysis or water-based cremation; a method of body disposal that involves dissolving the remains with low heat and chemicals and results in a solution and bones. The solution is nutrient rich and can be sprayed on plants as fertilizer or sent down the drain to the wastewater system. Euthanasia drugs are destroyed during the process. Remaining bones and teeth are ground to small particles or dust.

Aspirate: To draw back on the plunger before injecting to see what fills the hub; blood should fill the hub for some injections (such as IV or IC), but nothing should fill the hub for other injections (such as IM, SC, and IP).

AVMA: The American Veterinary Medical Association.

Barrel: The hollow center part of a syringe.

Bevel: The sharp, pointed end of the hypodermic needle that is cut on an angle. The tip of the needle is intended to be inserted into the vein with the bevel up.

Blink reflex (Palpebral reflex): Closing the eye in response to a touch on the surface of the eyeball. This is a response used to check for consciousness.

Blow: A term used to describe an injection outside the vein in the perivascular space.

Bore: A term used to describe the diameter of the opening at the end of a needle. The larger the opening the smaller the number used to describe that opening. An example is an 18-gauge needle has a larger opening than a 22-guage needle.

Burial: A method of body disposal where the carcass is covered under 4 to 6 feet of soil so that scavengers cannot get to the remains. Euthanasia drugs are still present in the carcass and burial sites must not be positioned where they can contaminate water or soil used for food production. Some burials are private. Many animals are buried in group sites, or in commercial landfills that have liners intended to prevent the leaching of chemicals into the environment from the buried wastes.

Burnout: Can happen to anyone in any profession. It results from prolonged workplace stress and a lack of control over one's work environment and/or workload.

Butterfly: A device used for drawing blood from a vein or for giving injections. Some call this tool a butterfly catheter, a "winged infusion set", or a "scalp vein set." The device gets its name because there are plastic "wings" on either side of a hollow needle.

Cadaver: A deceased body, might also be referred to as an animal carcass (especially for large animals).

Cardiac arrest: A part of the dying process, when the heart stops beating and there is no pulse.

Caudal: A position on the body that is toward the hind end or tail of the animal.

Cephalic vein: A vein located on the front leg that is commonly used for IV injections.

CETs: Certified Euthanasia Technicians, a designation provided by a state board or licensing agency that determines whether a shelter staff member has completed the required training and met the legal standards for performing euthanasia in an animal shelter.

Compassion Fatigue: Should more correctly be called Empathy Fatigue. It is an occupational hazard for those who work in care-giving professions such as nursing or animal welfare. It is made worse when people experience secondary (indirect) traumatic stress from witnessing the pain and suffering of others. It is not the same as burnout, although it can coexist with burnout.

Composting: A method of body disposal that involves covering the body in layers of organic materials that slowly decompose the remains and results in soil. Euthanasia drugs may still remain in the soil. Most commonly used for disposing of the remains of large animals.

Compounding: The process of making a new drug combination by mixing together one or more drugs, such as ketamine and xylazine to make PreMix. Some commercial pharmacies are licensed to compound medications for use by prescription (compounding pharmacies). It is illegal to compound medications or to dispense compounded medications in some states. Always check state pharmacy laws before compounding in-house or using commercially-compounded drugs in the shelter.

Consciousness: Pre-euthanasia drugs are used to change the level of consciousness of animals. The levels range from fully awake and aware of surroundings, to sedated (can be aroused by a stimulus and so still conscious), to anesthetized (not able to be aroused by a stimulus so is unconscious).

Controlled drug: Drugs that can be abused by people are regulated by the federal government and referred to as "controlled" substances. The drugs are classed from Class 1 to 5 with Class 1 drugs having higher drug abuse potential than lower classes of drugs. The DEA (Drug Enforcement Agency) is responsible for enforcing controlled drug laws and inspecting logs kept for the purchase and use of controlled drugs in the shelter. Shelters and veterinarians must be licensed by the DEA to purchase and use controlled drugs.

Cranial: A position on the body that is toward the front or the head of the animal.

Cremains: What remains of the body after incineration or water hydrolysis, the remains of bones and teeth will need to be crushed to form ashes that can be returned to owners or buried.

Cremation: A method of body disposal that is done by burning or incineration and results in ashes. Euthanasia drugs will be destroyed during the process.

CRT: Capillary refill time, a test done by pressing against the gums and checking that the color blanches then returns to pink when you let up the pressure, refill happens when then animal is alive and has good blood pressure, refill doesn't happen when the animal has very low blood pressure or has died.

DEA: The Drug Enforcement Agency of the federal government that is responsible for enforcing controlled drug laws. Issues licenses to qualified medical practitioners for ordering, storing, and using controlled drugs. Full licenses available to veterinarians. Limited licensing available to some animal shelters, varies by state. See Midlevel Practitioner.

Dead space: The space in the hub of a needle and syringe where a small amount of drug remains after giving an injection. This amount of drug is wasted and will cause slight errors in the recordkeeping for drug logs (called "hub loss").

Death: Must be confirmed using multiple methods to assure that both respiratory and cardiac arrest has happened as a result of the euthanasia process.

Decapitation: Removing the head of an animal, sometimes used as a secondary method of euthanasia when working with amphibians and reptiles.

Deep pain: A term used to describe the ability to feel pain coming from deep tissues like muscles and joints. The loss of deep pain is used to confirm whether nerves are responding to significant painful stimuli.

Depopulation: Done under the direction of an Incident Commander, usually from the Federal Government, when an entire herd or flock of animals must be euthanized as a group due to a disease outbreak or disaster situation.

Distal: Toward the toe.

Diversion: Suspected theft or misuse of controlled substances that were obtained legally by a facility licensed by the DEA and following proper DEA procedures for drug logging and record keeping.

Dorsal: A part of the body that is toward the top or uppermost part of the body when standing.

EAP: Employee Assistance Plan, a benefit offered by employers that provides anonymous access to a social worker or mental health counselor to help keep employees well.

EBI: Euthanasia by injection of sodium pentobarbital.

Emotional intelligence: The ability to recognize and manage your own emotions as well as recognize the emotions of others within whom you interact. An emotionally-intelligent person has self-awareness as well as empathy for others and good social skills to deal with people who might be hurting.

Euthanasia: From the Greek meaning "good death." Defined by the AVMA as, "A method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness, and causes rapid loss of consciousness followed by cardiac and respiratory arrest and death." (See sections I3, I5, I6 in the AVMA Guidelines for Euthanasia of Animals.)

Euthanize: The process of ensuring a "good death" that is compassionate and painless without excessive fear, anxiety, or stress.

Extension set: A tool used to extend the distance between the needle and syringe when giving injections. The tool consists of a length of tubing that comes in sterile packaging.

Extra-label: When a drug is used in a way that the label does not list, such as using a drug for a cat when the label says to only use on dogs. Only licensed veterinarians can legally use drugs extra-label if they explain why and make it known to the client (or the shelter). CETs should only use extra-label drugs under the direction of a veterinarian. Sometimes called off-label.

FAQs: Frequently asked questions.

FAS: A scale used to describe the fear, anxiety, and stress signs being displayed by an animal's body language. An animal can be relaxed and calm (low FAS), fractious and difficult to handle (high FAS), or somewhere in-between.

Fear: An unpleasant emotion that results from experiencing a perceived danger. Results in physiological changes in the body as a result of the reaction.

Flash: When blood is visibly drawn into the hub of the syringe after needle is correctly placed into a vein and the plunger of the syringe is drawn back (aspirated). A flash should be seen if the needle is properly placed for and IV or IC injection. A flash should NEVER be seen when giving a SC, IM, or IP injection.

Fomites: Anything that can spread germs once it has been in contact with an infected animal; such as a microchip scanner, food bowls, litter boxes, stethoscopes, clothing, shoes, or hands.

Fractious: Used to describe the behavior of an animal that is showing very high fear, anxiety, or stress and thus is difficult to handle or to approach.

Handler: The person holding the animal for euthanasia.

Heart Stick: Placing a needle into the chamber of the heart. This phrase is no longer used.

Hitting the vein: A slang phrase used to describe inserting a needle into a vein.

Hub Loss: The tiny amount of drug that remains in the dead space or hub of the needle and syringe after an injection. Over time, these tiny losses add up and cause small discrepancies in drug logs.

IC: An injection that is given intracardiac (directly into a chamber within the heart muscle), This type of injection is ONLY done on a fully anesthetized (unconscious) animal. Sometimes called by the slang term of "cardiac stick." Can be used as a final way to confirm that an animal is dead.

ICo: An injection that is given into the coelom (intracoelomic) of a bird, amphibian, reptile, or fish. The coelom is the chest and abdomen space that is not divided by a diaphragm as in mammals. The injection is similar to an IP injection for a small mammal.

IM: An injection that is given intramuscularly (directly into a muscle).

Immobilization: The use of physical and/or chemical means to restrict an animal's ability to move.

IN: A route for giving drugs to an animal by squirting the liquid up the nose (intranasal) where it can be absorbed through the mucus membranes lining the nasal cavity.

IP: An injection that is given intraperitoneal (directly into the abdominal cavity, not into a muscle or organ).

IV: An injection that is given intravenously (directly into a vein).

Jugular Vein: The vein in the neck that is used for IV access.

Kitty Magic (or Doggie Magic): A slang term used for a common combination of pre-euthanasia drugs made by mixing equal volumes of butorphanol (also called Torb or Torbugesic), dexmedetomidine injectable, and ketamine. Given by IM injection. Commonly referred to as BDK (although some might call it TDK).

Label Dose: The dose of drug on a drug label that is necessary for to be effective.

Lateral: Describes the location on the body that is away from the midline (the middle of the body), or on the outer part of the body.

Lateral saphenous vein: The vein on the outside of the back leg that is commonly used for IV injections.

Lethal Dose: The dose of drug that is needed to stop breathing and the heartbeat.

Medial: Describes the location on the body that is toward the midline (the middle of the body).

Medial saphenous vein (aka femoral vein): The vein on the inside of the back leg that is commonly used for IV injections.

Off-label: When a drug is used in a way that the label does not list, such as using a drug for a cat when the label says to only use on dogs. Only licensed veterinarians can legally use drugs off-label if they explain why and make it known to the client \(or the shelter). CETs should only use off-label drugs under the direction of a veterinarian. Sometimes called extra-label.

OSHA: Occupational Safety and Health Administration, an agency of the Federal government responsible for workplace safety.

OTM: Stands for "oral transmucosal." Used to note that a drug is given in the mouth, on the gums, or absorbed from the cheeks or under the tongue, but not intended to be swallowed.

Owner-Intended Euthanasia (OIE): A euthanasia process that includes the pet-owner in the decision-making for the process. The euthanasia might be requested by the pet-owner after consulting with a veterinarian at the shelter (owner-requested). The euthanasia might be performed either outside of the presence of the owner, or in the presence of the owner (owner-present).

Perivascular: The tissue and space around a vessel.

Pithing: A technique for causing brain death with a needle, used as a second or third method of euthanasia to ensure death of an amphibian or reptile.

Plunger: The part of the syringe that you pull or push in order to draw in or to push out the contents through the needle.

PO: From Latin standing for "per os." Used to note that a drug is given by mouth, or orally, and is intended to be swallowed.

PPE: Personal protective equipment, items such as goggles, face shields, disposable gloves, paper gowns, boot covers, Tyvek suits, N95 masks, etc are considered as PPE; OSHA requires use of PPE to prevent workplace injuries and SDS provides information about what PPE is required when using chemicals in the workplace. CETs should always wear PPE when working in the euthanasia room with any animals that might be ill with an infectious disease. Changing gloves and gown between animals and disinfecting work surfaces are the minimum PPE needed to prevent spreading infectious diseases from the euthanasia room to the rest of the shelter.

PR: A route for giving drugs to an animal by squirting the liquid through the anus and into the rectum (per rectum) where it can be absorbed through the mucus membranes lining the intestine.

PreMix: A slang term used for a combination of two pre-euthanasia drugs (ketamine/xylazine) given by an IM injection. The combination consists of sterilely mixing 2 mls of xylazine (at a concentration of 100mg/ml) with 10 mls of ketamine (also at a concentration of 100 mg/ml) into a relabeled, sterile bottle. The combination is safe, effective, and inexpensive. It does require controlled drug record keeping.

ProQOL: A free, self-test that measures professional quality-of-life, the test gives scores to help you measure compassion satisfaction, burn out, and secondary traumatic stress levels. The test is available from the Center for Victims of Torture at: proqol.org/proqol-measure

Proximal: Away from the toe, toward the dorsal part of the body.

Reflex: Involuntary reaction, such as blinking or muscle withdrawal, after a stimulus (such as a touch or a pinch). Used to help determine whether an animal is conscious or unconscious of its surroundings and unable to feel pain.

Rendering: A commercial process for body disposal that involves converting the carcass into other products that can end up in the food chain. Rendering does not destroy euthanasia drugs, so animals that have been euthanized by injection should not be disposed of by this method.

Respiratory Arrest: A part of the dying process, when the animal stops breathing and there is no movement of the chest wall.

Restraint: Describes keeping an animal in a position needed to perform a procedure, such as to give an injection. The technician should apply the least restraint needed to get the task done with the minimal fear and stress for the animal and the handler. Chemical restraint can happen when using pre-anesthetic drugs. Physical restraint can happen using low-stress handling techniques, such as towel wraps, distractions, leashes, etc. Shelters also have specialized restraint tools to safely handle animals that might be dangerous, such as control poles, feral cat dens, syringe poles, etc.

Rigor mortis: A post-mortem (after death) change that results in the muscles of the body becoming rigid. This change is a final way to confirm death, but it might take a long time to happen, if it happens at all.

Rostral: Toward the nose.

Sally Port: A secure entrance for animal control vehicles to load and unload, not in view of the public.

SC: An injection that is given subcutaneously, or just under the skin.

SDS: Safety Data Sheet, previously called MSDS for Material Safety Data Sheet, required by OSHA to be available for employees to review for every chemical found in the workplace; the sheet provides information about the nature of the chemical hazards, first aid for exposures, and recommended PPE when using the chemical.

Sedation: A state of consciousness that appears like the animal is calm or sleeping, but can still be aroused by a stimulus. Sedated animals can still feel pain and can cause injuries to themselves or others if startled. Certain pre-euthanasia drugs are given to produce sedation.

Shaft: The part of the needle between the hub and the bevel tip. The shaft comes in different lengths (measured in inches). The shaft also comes in different widths or diameters (measured in gauges). The larger the gauge, the smaller the diameter of the shaft.

Sharps: A slang term used to describe medical waste that is sharp, such as needles and surgical blades. Sharps must be disposed of in an approved medical waste container that is colored red.

Signalment: The observable characteristics of a pet; such as its breed, markings, color, fur type, sex, age, weight, species, etc.

SOP: Standard Operating Procedure, a written protocol for doing a task.

Stress: Environmental activities that cause changes in the body and hormones Stress can be acute or chronic. Stress can be a positive change to help an animal escape from an immediate threat or it can become a long-term negative change that affects the brain and physiology and results in poor health and welfare for an animal.

Syringe tip: The end opposite the plunger where a needle attaches to a syringe; the tip can be of four different types: luer-lock (needle twists on like a screw), slip (needle slips on and off), eccentric (needle attaches off the center of the barrel), or catheter (cone-shaped to accept a piece of tubing rather than a needle).

Technician: The person administering the euthanasia drug.

Thoracic inlet: The most cranial part of the chest, where the neck meets the chest, marked by the collar bones on a human.

Toe pinch response: The withdrawal of the foot when the toe is firmly pinched. This is a response used to confirm consciousness.

Tourniquet: A tool used to hold off (occlude) a vein when an extra set of hands is not available.

Transdermal or Topical: A route for giving drugs to an animal by applying the drug to the skin (dermis) where it can be absorbed.

Unconscious: Results from a depth of anesthesia that results in lack of reflexes (cannot react to stimuli). Unconscious animals cannot feel pain, do not react to touch or pinch. Only unconscious animals are candidates for intracardiac (IC) injections.

Units of Measurement: Gauge (abbreviated as g) refers to the diameter of a needle or wire, the larger the g the smaller the diameter. The metric system is used to calculate drug doses and volumes.
cc = cubic centimeter (measures volume/space), 1 cc equals 1 ml
ml = milliliter; one 1000th of a liter (measures liquid volumes) 1 ml equals 1 cc
mg = milligram; one 1000th of a gram (measures weight/mass)

Veins: Blood vessels that carry blood to the heart. For euthanasia, the most common veins used for injection are in the front leg (the cephalic vein) and in the hind leg (the saphenous vein, that travels both medial and lateral in the hind leg).

Ventral: A part of the body that is toward the ground or underside of the animal when it is standing.

Zoonotic: A disease or infection that is able to be transmitted between animals and people, such as rabies.

Dosage Chart for tiletamine/zolazepam and PreMix (ketamine/xylazine combination)

Animal's Weight (pounds)	**Milliliters** (ml)
5	0.25
10	0.50
15	0.75
20	1.00
25	1.25
30	1.50
35	1.75
40	2.00
45	2.25
50	2.50
55	2.75
60	3.00
65	3.25
70	3.50
75	3.75
80	4.00
85	4.25
90	4.50
95	4.75
100 (and up)	5.00
	(0.50 ml/10 pounds)

Injection Methods—Quick Reference

IV—Intravenous (Injection of sodium pentobarbital into a vein)

- **Species recommended:** dogs, calm and friendly cats
- **Dose:** 39 mg/lb (usually 1 ml/10 lbs)
- **Circulatory compromised:** 78 mg/lb (2 ml/10 lbs)
- **Injection speed:** rapid (1–2 ml/second) and consistent with good technique
- **Dog veins:** cephalic, lateral saphenous
- **Cat veins:** cephalic, medial saphenous (femoral)
- **Syringe retracts:** small volume (flash) of blood
- **Time to loss of consciousness:** ~5 seconds
- **Time to deep anesthesia:** ~10 seconds
- **Time to cessation of respiration:** ~20 seconds
- **Time to cessation of heartbeat (death):** ~40 seconds
- **Time to cardiac standstill (no fibrillation):** ~2–5 minutes

IC—Intracardiac (Injection of sodium pentobarbital into one of the four heart chambers)

- Unconscious animals only
- **Species recommended:** all
- **Dose:** 39 mg/lb (usually 1 ml/10 lbs)
- **Circulatory compromised:** 39 mg/lb (usually 1 ml/10 lbs)
- **Needle insertion point:** right or left side, 4th intercostal space, or sternally in cats
- **Syringe retracts:** large volume (fill) of blood
- **Injection speed:** slow (0.5–1 ml/second) and consistent with good technique
- **Time to cessation of heartbeat (death):** 5–10 seconds
- **Time to cardiac standstill (no fibrillation):** ~2–5 minutes

IP—Intraperitoneal (Injection of sodium pentobarbital into the abdominal cavity—needle passes through the skin, muscle wall and peritoneum)

- **Species recommended:** conscious, calm and friendly cats; conscious puppies under five weeks, conscious or unconscious small rodents
- **Dose:** 117 mg/lb (usually 3 ml/10 lbs)
- **Circulatory compromised:** not usually recommended
- **Injection speed:** slow (0.5–1 ml /second) and consistent with good technique
- **Needle insertion point:** ventral, midline, ~2" below (caudal to) umbilicus
- **Needle angle/depth:** right angle to the skin/~3/4 inch
- **Syringe retracts:** suction (no fluid, no air)
- **Time to loss of consciousness:** ~2 minutes
- **Time to deep anesthesia:** 3–4 minutes
- **Time to cessation of respiration:** ~6 minutes
- **Time to cessation of heartbeat (death):** ~8 minutes
- **Time to cardiac standstill (no fibrillation):** ~10 minutes

Index

A

Accidental injections, human, 11, 75
Alligators, 97
American Veterinary Medical Association
  euthanasia criteria, 1-3, 98
Amphibians, 98
Analgesia, 39-40
Anesthesia
  stages of, 38-41
Animal bites, 74
Animal-related injuries, 72-75
Animal handling and restraint, 13-22
Aspiration of blood, 53

B

Bats, 71, 100
Bears, 101
Birds, 94
Birdshot, 104-105
Bites, 74
Blink reflex, 62-64, 68, 101
Blown veins, 56-57
Body disposal, 69-71, 107
Brain
  anatomy of, 41
  gunshot effects, 105-108
  sodium pentobarbital effects, 38-41
Brainstem, 39-40

C

Cat bags/nets, 22
Cat grasper/tongs, 22
Cats
  injection difficulties, 15, 46, 47
  internal organs view, 59
  pre-euthanasia anesthetic dosages, 30-34
  restraint of, 15-16
  sodium pentobarbital dosage, 57
Cattle
  euthanasia procedure, 99
  restraint of, 102
  shot location for field euthanasia, 102-110
Central nervous system, 38-41
  effect of sodium pentobarbital, 38-41
  effect of xylazine, 34
Cephalic vein injections, 46
Compassion fatigue, 82-89
Consciousness, 30,62
Controlled substances
  classification of 29, 77
  controlled drug schedules, 77
  storage of, 78-79
  record-keeping requirements, 79-80
  inventory records, 80
  reporting theft/loss, 80
Control poles, 20
Coyotes, 101
Cremation, 69
Crocodiles, 97

D

Death verification,10, 27, 55, 65-68, 94, 97, 104
Decompression chamber, 1
Deer, 101, 106
Disposal of bodies, 69-70, 107-108
Dogs
  circulatory system, 45
  injection difficulties, 45-47, 49, 50, 52
  pre-euthanasia anesthetic dosages, 31-33, 56
  restraint of, 13-15, 17-21
Donkeys, 98
Dosages
  calculating, 31-33, 57, 61, 63
  for cats, pre-euthanasia anesthetics, 31-32
  intracardiac injections, 63, 64
  intraperitoneal injections, 61, 62
  intravenous injections, 57, 58
  for large animals, pre-euthanasia anesthetics, 32-33
  PreMix (xylazine/ketamine) combination, 31-33
  for reptiles, pre-euthanasia anesthetics, 95-97
  for small animals, pre-euthanasia anesthetics, 35–36
  tiletamine/zolazepam, 32-33
  xylazine, 33-34
Drug cabinets, 78

E

Elk, 101
Equipment-related injuries, 72-74
Euthanasia. See also Field euthanasia; Injections; Sodium pentobarbital
  criteria for, 2-3
  death verification, 10, 27, 55, 65-68, 95, 97, 105
  disposal of bodies, 69-70, 107-108
  by gunshot, 105-108
  human stress, 82-89
  mass euthanasia, 108
  selection criteria, 4-6
  standards for, 6-7
  verifying death, 65-68
  volunteers and, 7
  written protocol for, 6-7
Euthanasia-related stress, 82-89
Euthanasia area
  cleaning considerations, 23
  layout and design, 23-24
  lighting for, 24-25
  recommended equipment, 25-27
  ventilation for, 25
Excitement stage, 39-40
Eye Injuries, 73
Eyewash stations, 23

F

Femoral veins . See Medial saphenous veins
Feral cat box, 21
Ferrets, 94
Field euthanasia, 104-107
Firearms, 104-105
Fish, 97
Forebrain, 41

G

Gas chambers, 1-2
Gerbils, 93
Gloves, 18
Goats, 99, 106
Guinea pigs, 94

Gunshot
angles and points of entry, 105
for field euthanasia, 106-108

H

Hamsters, 17, 93
Heartbeat cessation, 58, 62, 63
Heart injections. See Intracardiac injections
Holding off veins, 12, 50, 53
Horses
euthanasia procedure, 47, 98
jugular vein location, 47
restraint of, 98, 102-103
shot location for field euthanasia, 108
use of xylazine, 34
Human safety. See also Compassion fatigue.
accidental injections, 72-73
animal-related injuries, 25-26, 74
equipment-related injuries, 25-26
eye injuries, 73
large animal dangers, 98

I

IC injections . See Intracardiac injections.
Immobilization, 3, 94-102
Inhalant anesthetics, 37
Injections
accidental injections to humans, 75
difficulties with, 34-36, 47, 50, 60
intracardiac, 62-64
intramuscular, 34-36
intraperitoneal, 58-61
intravenous, 42, 44-58
subcutaneous, 34-36
syringe preparation, 8-11
Intracardiac injections
administering injections, 43, 62-64
advantages of, ,43, 62
determining unconsciousness, 62-63
disadvantages of, 62
dosage, 64
location for, 63-64
needle size for, 43
Intrahepatic injections, 60
Intraperitoneal injections
advantages of, 42, 58
disadvantages of, 43, 58-59
dosage, 59-60, 61, 62
locating the injection site, 59-60
making the injection, 59-60
post-injection care, 60
reaction time, 60
Intravenous injections
advantages of, 42
aspirating the syringe, 53
cephalic vein injection, 46-50
disadvantages of, 42
dosage, 57-58
drug injection, 54-55
finding a difficult vein, 56-57
holding the syringe, 47-48
injection speed, 57
inserting the needle, 45
jugular vein injection, 55-56
lateral saphenous vein injection, 46
medial saphenous vein injection, 47
proper injection site, 48-49
removing the needle, 55
securing the syringe, 51-53, 55-56
selecting veins, 45
IP injections. See Intraperitoneal injections.
IV injections. See Intravenous injections.

J

Jugular vein injections, 45, 56, 98-99

K

Ketamine, 31-34, 97-98

L

Landfill disposal, 69, 108
Large animals
  disposal, 69
  field euthanasia, 101-107
  human safety concerns, 98-99
  intravenous injections, 98-101
  jugular vein injections, 45, 56-57
  pre-euthanasia anesthetic dosages, 30-34
  sodium pentobarbital dosages, 98
  syringes, 9
  xylazine use, 34
Lateral saphenous vein. See Saphenous vein injections.
Livestock. See large animals.
Lizards, 97

M

Medial saphenous veins, 47
Medulla oblongata. See brainstem.
  sodium pentobarbital effects, 65
Mice, 61, 93
Middle brain, 41
Moose, 101
Mountain lions, 101
Mules, 98
Muzzles, 19

N

Needles
  accidental wounds to humans, 9-10, 75
  disposal of, 9-10
  insertion into vein, 47-48, 51-52, 58
  for intracardiac injections, 63
  for intraperitoneal injections, 59-62
  removal from vein, 55
  sizes of, 10
Nye tourniquets, 11-12, 50

O

Occupational Safety and Health Administration, 27
Oral administration
  sodium pentobarbital, 37
Owner intended euthanasia, 90-92

P

Per Os (PO), 37
See also oral administration
Pigs
  euthanasia procedure, 99, 107-108
  restraint of, 102
Plexiglass shields, 21
Pole syringes, 16, 97
Pre-euthanasia anesthetics
  administration, 34-36
  advantages of, 28
  disadvantages of, 36
  eye injuries to humans, 73
  inhalant anesthetics, 36
  injection devices, 35
  ketamine, 31-33
  licensing for, 76-81
  restraint for administration of, 34-35
  tiletamine/zolazepam, 32-33
  types of, 33-35
  xylazine, 33

PreMix, 31-32, 89-92
Primates, 101

R

Rabbits, 17, 93
Rabies, 1, 71-72, 100-101, 105
Rabies pole . See Control pole.
Raising the vein, 49-50
Rats, 93
Reflexive movements, 62-63
Reptiles, 95-97
Restraint
  animal handling tools, 17-22
  approaches to, 13
  behavior signals, 13
  for cats, 15-16
  concepts of, 13
  control poles, 20
  for dogs, 14-15
  for field euthanasia, 102
  small dog technique, 15
Rigor mortis, 65

S

Saphenous vein injections, 46-47, 55-56
Sedation, 3, 30
Sharps containers, 11
Sheep
  restraint of, 103
  shot location for field euthanasia, 99, 106, 108
Skunks, 100
Shot locations by species, 106-108
Shotguns, 104-105
Small mammals
  euthanasia procedures, 93-94
  intraperitoneal injections, 58-59
  Premix, 31
  pre-euthanasia anesthetic dosages, 31
Snakes, 95
Snapping turtles, 96
Sodium pentobarbital
  classification of, 77
  dosages, 58, 62, 63
  for field euthansia, 103
  inventory of, 80
  intracardiac injection, 43, 62–64
  intraperitoneal injection, 43, 58-62
  intravenous injection, 42, 46-56
  legal requirements, 76-79
  method of action, 38-41
  oral administration, 44, 78
  powder form, 78
  record-keeping requirements, 80
  security requirements, 79-80
  state licensing regulations, 76-79
  storage of, 78-79
Squeeze cage, 21
State laws
  pre-euthanasia anesthetics licensing, 76-79
  Sodium pentobarbital licensing, 76-79
Stethoscopes, 66-68, 97
Syringes
  aspirating, 52-54, 60,63
  centric, 9
  locking hubs, 9
  eccentric, 9-10
  for pre-euthanasia anesthetics, 34-36
  preparation of, 9
  securing, 51-52, 54-55
  sizes of, 9-10

T

Terrapins, 96
Tiletamine/zolazepam, 32-33
Toe pinch reflex, 63, 68
Tortoises, 96
Tourniquets, 11-12, 50
Tranquilization, 3
Turtles, 96

U

Unconsciousness, 3
  determining, 62-64

V

Ventral midline injections, 59-61
Verification of death, 65-68, 91, 95, 105
Vital functions
  effect of sodium pentobarbital, 41

W

Wildlife, 99-101

X

Xylazine, 31-34, 98

This third edition of the Euthanasia Reference Manual by Humane World for Animals (formerly called the Humane Society of the United States) was revised by the University of Florida