



YOUNG PUPS

Parasite control, vaccination, spaying and neutering, and proper nutrition are critical for young animals living in a shelter setting.



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**MEET THE AUTHOR**

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CONTINUING EDUCATION**ETHICS/WELFARE**

Pediatric Patients in the Shelter Setting

Shelter medicine has become recognized as an important and rapidly growing part of the veterinary field, particularly in the past 10 to 15 years.

As a result, the standard of care for companion animals in the shelter setting has continued to develop, and meeting it has become a more significant part of the shelter staff's role. This standard of care is even more critical for pediatric animals in the shelter population, mainly because they face a greater level of risk than adults. As this subset of the veterinary profession grows each year, it is important to understand not only the role shelter professionals can play to ensure the wellbeing of all shelter animals but especially to better enable young animals to thrive in this setting.

SHELTER MEDICINE VERSUS PRIVATE PRACTICE

The goal of private practice medicine is to provide lifelong care for owned animals. Many treatment options, preventive medicines, and general health checks are readily available in the private practice setting. Comparatively, shelter medicine focuses on the care and maintenance of both individual animals and a population of animals for a short period of time. Shelter settings are typically less equipped with long-term treatment options and diagnostic tools. Shelter medicine also often experiences the challenge of providing care for animals with unknown health, behavioral, and disease exposure histories.

**BOX 1****Examples of Core and Noncore Vaccines²****Core vaccines****Dogs**

- DA2PP
 - Distemper
 - Adenovirus-2
 - Parvovirus
 - Parainfluenza
- Rabies
- *Bordetella bronchiseptica*

Cats

- FVRCP
 - Panleukopenia
 - Calicivirus
 - Herpesvirus-1
- Rabies

Noncore vaccines**Dogs**

- Lyme
- *Leptospira*
- Canine Influenza

Cats

- Feline leukemia virus (FeLV)
- Feline immunodeficiency virus (FIV)
- *Chlamydomphila felis*
- *Bordetella bronchiseptica*

VACCINATION

Vaccination is important for animals in all life stages, but especially for pediatric patients, given their immunocompromised state. The ideal protocol for shelters is to vaccinate animals on intake to prevent and reduce the spread of diseases within the shelter. Although most private practices are able to offer core and noncore vaccines, shelter systems often rely on donations or unsteady funding to supply their core vaccine stock. Shelters with a limited supply of vaccines must therefore decide which types to stock and which animals will receive them, bearing in mind the appropriate ages at which to vaccinate and booster, the locations and routes of vaccine administration, and the risks of vaccinating ill animals.

Basic Guidelines

Vaccines used in the veterinary field include attenuated (modified-live), inactivated (killed), recombinant, and toxoid vaccines.¹ The type affects the vaccine's schedule as well as location and route of administration (e.g., subcutaneous, intramuscular, intranasal). To prevent

adverse reactions—such as hypersensitivity, injection site sarcoma, and severe inflammation—shelters, like private practices, should follow predetermined vaccine guidelines dictating the route of vaccine administration for all patients.^{1,2} Shelters should also consider adopting the practice of using standardized vaccine locations, such as administering a rabies vaccine in the right rear limb in all patients.

Vaccines can be divided into core and noncore vaccines (**BOX 1**). Core vaccines are considered essential in all animals to prevent diseases that can be endemic, zoonotic, or highly contagious, and are very effective. Noncore vaccines are typically given only to animals with a specific seasonal, life stage, or lifestyle risk, even when they are highly effective. Most shelters concentrate their medical funding on stocking core vaccines for their population and prefer attenuated vaccines, which have highly immunogenic properties that lead to a sustained immune response. State or county regulations may dictate recommended vaccines, the licensure required to administer vaccines, and vaccine administration location for some shelters.

When to Vaccinate

An animal's age is one of the most important parts of pediatric vaccination. Vaccinating underage animals is not beneficial for either the animal or the shelter, as vaccines do not confer immunity in underage animals and may even pose risks for the development of antibodies against the disease of interest. To ensure that all shelter professionals can reasonably and consistently assign ages to their pediatric patients, visual displays showing examples of various stages of dentition and other age-distinguishing features are beneficial.

Vaccine schedules for pediatric animals are distinct from those for adults. Attenuated core vaccines, such as DAPP (distemper, adenovirus, parvovirus, and parainfluenza) and FVRCP (rhinotracheitis, calicivirus, and panleukopenia), should be given as early as 4 weeks of age and further administered in sequential doses at intervals of 2 to 4 weeks until the animal is at least 18 to 20 weeks of age.^{1,2} Inactivated core vaccines, such as rabies, should be given no earlier than 12 weeks of age, with a second dose required within a year of the initial dose.^{1,2} Although following a vaccination schedule for all pediatric intakes would be the perfect scenario to ensure complete immune protection, other circumstances (e.g., adoption, transfer, or foster home) may disrupt the schedule in the shelter setting.

Research currently suggests that nursing neonates are not at risk of adverse effects caused by vaccination of the mother. Thus, vaccination of nursing mothers is strongly encouraged in a shelter setting.³ However, administration of modified-live vaccines in pregnant cats has been shown to have deleterious effects on unborn kittens.^{3,4} Although this effect is reduced in pregnant cats that have received prior vaccination for panleukopenia, many shelter cats arrive with no known vaccination history. Shelter professionals should practice caution when considering vaccinating pregnant animals with attenuated vaccines.⁴ Research is still ongoing regarding the effects of vaccinating pregnant dogs.

PARASITE CONTROL

Parasite control protocols vary from region to region. To help reduce the transmission of parasites in the shelter, proper cleaning and handling protocols based on regional parasite prevalence and risk are necessary. Parasiticides should also be stocked and administered based on regional and individual risk and evidence of infection. For example, many shelters cannot afford prophylactic treatment for tapeworms in their entire

population, but swift treatment for tapeworms is suggested upon seeing the parasite in stool.

Intestinal Parasites

The most common intestinal parasites found in companion animals are tapeworms, roundworms, hookworms, whipworms, coccidia, and giardia. Roundworms and hookworms can be transmitted from mother to fetuses through the placenta or from mother to newborns through mammary gland secretions. Up to 80% of all puppies are infected with roundworms, and fecal exams only detect about 20% of affected puppies (**FIGURE 1**).⁵ Given the likelihood of parasitic infestation in young animals without a strong immune system, it is recommended to treat all pediatric patients for intestinal parasites, regardless of fecal examination.

The most common deworming treatment for roundworms and hookworms in pediatric patients is pyrantel (Nemex; Zoetis, zoetisus.com). In a shelter setting, puppies and kittens should be treated on intake or as early as 2 weeks of age, with subsequent doses given every 2 to 3 weeks until the age of 8 to 12 weeks.⁵ Similarly, coccidia in pediatric patients can be treated with ponazuril off-label. Ponazuril is advised to be given starting at 2 to 3 weeks of age, with subsequent doses every 10 to 14 days based on clinical signs and fecal examination.⁵ Retreatment is very important during this life stage to ensure proper protection.



FIGURE 1. Six-week-old puppy with a classic “potbelly” stomach. This puppy was later diagnosed with roundworms and hookworms.

Fleas and Ticks

Flea and tick preventives can also be used in a shelter setting. Many options exist, and several are approved for pediatric patients. Frontline (Boehringer Ingelheim, boehringer-ingelheim.com) can be used on puppies aged 8 weeks and weighing at least 5 pounds and kittens aged 8 weeks weighing at least 1.5 pounds.⁶⁻⁸ Advantage Multi (Bayer, bayerdvm.com) can be used on puppies aged 7 weeks, as long as the puppy weighs more than 3 pounds.⁹ Similarly, Advantage Multi can be used on kittens 9 weeks of age and older, as long as the kitten weighs more than 2 pounds.¹⁰

NUTRITION

Ideally, shelters would provide nutrition tailored to the specific life stage of each animal and avoid changes in diet to prevent gastrointestinal upset. Realistically, shelters often rely on donors for their food supply. The



Challenges of the Shelter Setting

Shelter professionals share a goal in understanding and maintaining the health and welfare of all animals in a shelter system. The Five Freedoms of Animal Welfare, developed in the 1960s in response to the need for a standard of care in the food animal industry, outline basic standards of care that have since been adapted and are recognized as a standard of care for all animals in captivity. They state that animals in captivity should have freedom:⁹

- From hunger and thirst
- From discomfort
- From pain, injury, and disease
- From fear and distress
- To express normal behavior

In shelter settings, these freedoms specifically include the provision of free-choice fresh water, a sustainable diet, a comfortable resting area, shelter from the elements, prevention of injury and disease, and an ability to carry out species-specific activities.

It can be difficult for shelters to maintain these minimum standards of care while

simultaneously ensuring that animals flow through the system. One of the biggest challenges facing shelter medicine today is the lack of oversight from a governing body as exists for other veterinary services and hospitals. There is no governmental board of veterinary professionals dedicated to ensuring the health and welfare of all shelter animals as individuals and as a population, and some shelter employees may lack adequate training and education to truly understand the level of care needed in this regard.

This is problematic for 2 reasons: some animals may be experiencing insufficient care, and some undersourced shelter systems are not equipped to handle the changes necessary to accomplish appropriate standards of care for all animals at all times. Shelters often lack space, supplies, and manpower to uphold the levels of care needed. The Association of Shelter Veterinarians' Guidelines for Standards of Care in Animal Shelters, a scientifically based

assessment of animal welfare, is an excellent resource for information on ideal standards of care for all shelters to use in assessing their services.

The success of an animal shelter depends on the people who interact with and care for the animals housed there and is heavily limited by the time and money needed to successfully train and educate employees on shelter best practice protocols. While volunteers can reduce the number of staff needed, liability risks may prevent their use for particular tasks. Any amount of time employees spend working at the shelter incurs costs, a matter that must remain at the forefront of shelter directors' budget considerations. Despite this, proficient employee training is absolutely necessary to ensure appropriate animal welfare and the overall health of shelter animals and to streamline outcomes in the shelter setting.

⁹ *The Association of Shelter Veterinarians. Guidelines for Standards of Care in Animal Shelters. sheltervet.org/assets/docs/shelter-standards-oct2011-wforward.pdf. Accessed March 7, 2020.*

resulting variety of pet food brands, types, and sources fed to shelter animals can cause some animals to have inappetence or gastroenteritis or to display signs of food allergies. Nursing, pregnant, and pediatric populations can be particularly at risk for adverse effects, as they require specific nutrition to maintain a positive energy balance and facilitate proper growth and development. Considering the lack of resources many shelters face, tailored nutrition for these specific populations is sometimes not feasible, so promptly getting these animals into foster homes or transferred to a rescue is imperative. This is particularly true for orphan neonates, which require constant monitoring and feeding that is usually not possible in the shelter setting.

Developing puppies and kittens should be fed at least 3 times a day to ensure adequate nutrition. Each species has distinct nutritional requirements, but variability exists within species as well. Small-breed puppies need a diet high in energy and protein, while large-breed puppies require a high-protein diet with less caloric

density to promote proper growth and development.¹¹

If feasible, neonates should nurse from their mother to get the appropriate amount of colostrum. This is especially critical from the time of birth up to 8 hours in puppies and up to 6 hours in kittens. Kittens do not receive antibody protection after the 16-hour mark, and puppies stop receiving antibody protection at the 24-hour mark.³ If the neonates are truly orphaned, they should be started on a quality milk replacement formula immediately.

HUMANE EUTHANASIA WHEN DEEMED MEDICALLY NECESSARY

Euthanasia, although often a difficult option for shelter animals with no other treatment, is never an easy choice to make. However, shelter animals have a right to humane, peaceful, and lawful euthanasia when considered the most humane course of action. Shelters should follow euthanasia protocols outlined in the

Association for Shelter Veterinarians' Guidelines for Standards of Care in Animal Shelters to euthanize dogs and cats with the highest standards of humane practice.¹² In these guidelines, the mechanics as well as the safety and regulatory components of euthanasia are strongly considered for every animal. Additionally, every state has specific information regarding the process of euthanasia and the licensure, education, and training required to euthanize animals properly.

Euthanasia is considered for pediatric animals that suffer from congenital abnormalities or highly infectious diseases, demonstrate failure to thrive, or have injuries immediately affecting quality of life that are not promptly treatable. The most common and humane option for pediatric euthanasia is via intraperitoneal (IP) injection in kittens and puppies. IP is the simplest, safest, and, if done correctly, most painless option, allowing for quick and painless absorption of the solution by the abdominal viscera.¹³ Compared to intravenous (IV) and intracardiac (IC) routes, IP injection requires 3 times the volume of euthanasia solution; therefore, shelters typically reserve this route for animals requiring smaller volumes.

Pure sodium pentobarbital must be used for IP injection, as additives to euthanasia solutions can cause pain. Sodium pentobarbital is labeled for use in cats and dogs, whereas pentobarbital is labeled for use in dogs only. Doses for sodium pentobarbital are 3 mL per 10 pounds of body weight for IP injections.¹³ The full volume must be administered to the animal to prevent peritonitis. For IV and IC injections, the dose is 1 mL per 10 pounds, making these routes more likely options in larger animals.

SPAYING AND NEUTERING

Shelter medicine aims to reduce the animal overpopulation by spaying and neutering animals in the shelter system. The American Veterinary Medical Association has endorsed neutering and spaying of pediatric animals as early as 6 weeks of age if they are otherwise healthy and robust;¹⁴ however, there is much debate on what age is safe enough for animals to undergo gonadectomy.

Age

Private practices can be assured their patients will return after completing their growth and development at 6 to 12 months of age and therefore are more

likely to delay sterilization surgery until that time. Shelters must consider the benefit of early spaying and neutering in decreasing pet overpopulation. Also, in a shelter setting, the faster animals can leave the shelter, the higher the probability they will not encounter diseases while in the shelter. It is typically for this reason that shelters opt to alter their pediatric patients early, rather than delaying gonadectomy until they have fully matured (**FIGURE 2**).

Literature remains scant on the subject of early spay and neuter surgeries, with most studies having selection bias and numerous interplaying variables, such as differences in breeds. Some spay and neuter studies have shown that neutering male puppies at a young age shows more benefits than risks, whereas others have shown that female puppies spayed at an early age tend to have an increase in urinary incontinence.¹⁵ On the other hand, a 2001 review of literature article states that the adverse side effects are no greater in animals neutered at the age of 7 weeks than in ones altered at 7 months of age.¹⁵ Numerous studies indicate that cats show no signs of increased behavioral or physical problems after gonadectomy. Shelter professionals must consider the benefits and risks associated with each specific patient.

SURGERY

Although spaying and neutering shelter animals before adoption is ideal, not all shelters are suited to perform surgeries on site or have adequate funding to pay for these surgeries at an off-site location. Shelters may use rescue agencies, other humane societies, community private practice



FIGURE 2. A 10-week-old kitten recovering from a spay at a university shelter medicine program.



veterinarians, or high-quality high-volume spay and neuter clinics to have their population sterilized.

Animals that undergo gonadectomy between 6 to 16 weeks of age should be provided with small meals for up to 2 to 4 hours before surgery. Animals older than 16 weeks should be fasted for a minimum of 4 hours, but not more than 6 hours, before surgery.¹⁴ Feral kittens and cats tend to be an exception due to the safety risk to shelter staff and should be left in their traps until the time of surgery, but they can be offered food at the appropriate time if safe for the handler to do so. After surgery, kittens and puppies should be offered small amounts of food once completely recovered from general anesthesia to help prevent hypoglycemic episodes.

Littermates should be housed together both before and after fully recovering from general anesthesia to prevent separation anxiety. Immediately after surgery, during recovery from anesthesia, animals should be housed independently for monitoring of vital signs and appropriate recovery. Thermoregulation is key in pediatric animals, which are more likely to lose heat under general anesthesia. Warm fluids and extra warming blankets are suggested to help prevent hypothermia, but patients must be monitored to ensure hyperthermia is not induced.

Altered Status Identification

Several methods of indicating an animal has been altered exist; the most simple and common include abdominal tattoos and ear tipping. Both of these clearly signal that an animal has been spayed or neutered. Ear tipping is typically done in the feral cat population and allows caretakers and community members to identify the sex status of that particular cat from a safe distance. Both identification methods are good practice to allow for better streamlining of animals through the shelter system by avoiding confusion on altered status of animals coming into the shelter and ensuring sterilized animals do not undergo unnecessary anesthesia.

IMPROVING ADOPTION OUTCOMES

Many pediatric animals in shelters are adopted quickly, but occasionally problems arise that prolong their time in the shelter, such as illness or extended wait time for gonadectomy. In these cases, it is up to shelter staff to ensure that the animals are being properly socialized and trained so that when they can be adopted, they are

used to being handled. Inappropriate behaviors such as jumping, excited nibbling, and overall excitability can significantly lessen an animal's chances of being adopted. If these problems are not taken care of through redirecting and training, they can lead to a pediatric or young animal staying in a shelter well into adulthood and possibly never making it out.

It also can be very beneficial for shelters to give adopters of pediatric animals information on how to ensure their animal is a forever pet. This could include information on microchipping (if the animal is not microchipped before adoption), ensuring the microchip information is always up-to-date, socializing young animals, and keeping up with vaccinations and wellness visits at local veterinary hospitals. **TVN**

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CONTINUING EDUCATION

Pediatric Patients in the Shelter Setting

TOPIC OVERVIEW

This article provides an overview of basic challenges for animal shelters and essentials of care for pediatric patients in a population setting. These include prevention of infectious disease, pediatric sterilization, and ways to ensure the safety and wellbeing of shelter animals.

LEARNING OBJECTIVES

Upon completion of this article, veterinary nurses should be able to describe and implement best practices for ensuring the welfare and health of pediatric animals in a shelter setting. Readers should also be able to identify the challenges of shelter medicine and changes that can be made to better the life of a shelter animal.

The article you read has been submitted for **RACE approval for 1 hour of continuing education credit** and will be opened for enrollment when approval has been received. To receive credit, take the approved test online for free at vetfolio.com/journal-ce. Free registration on **VetFolio.com** is required. Questions and answers online may differ from those below. Tests are valid for 2 years from the date of approval.

- 1. What are the Five Freedoms?**
 - a. Freedom from hunger; freedom from thirst; freedom from discomfort; freedom from pain, injury, and disease; and freedom to express normal behavior
 - b. Freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, and disease; freedom to express normal behavior; and freedom from fear and distress
 - c. Freedom from hunger and thirst; freedom from discomfort; freedom from pain and injury; freedom from disease; and freedom from fear and distress
 - d. Freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, and disease; freedom to express normal behavior; and freedom from distress
- 2. _____ is a core vaccine for puppies, and _____ is a core vaccine for kittens.**
 - a. DA2PP; FVRCP
 - b. Lyme; FeLV
 - c. Rabies; FeLV
 - d. DA2PP; *Bordetella bronchiseptica*
- 3. What is the earliest age that vaccination can begin?**
 - a. 2 weeks
 - b. 4 weeks
 - c. 8 weeks
 - d. 12 weeks
- 4. What is the earliest age puppies and kittens can stop receiving vaccinations if they are still in the shelter?**
 - a. 18–20 weeks
 - b. 20–22 weeks
 - c. 14–16 weeks
 - d. 16–18 weeks
- 5. At what age can deworming of puppies and kittens begin?**
 - a. 2 weeks
 - b. 4 weeks
 - c. 6 weeks
 - d. 8 weeks
- 6. _____% of puppies are infected with roundworms.**
 - a. 60
 - b. 80
 - c. 75
 - d. 90
- 7. In shelters, what is the preferred route of euthanasia administration in pediatric animals?**
 - a. Intravenous
 - b. Intracardiac
 - c. Intraosseous
 - d. Intraperitoneal
- 8. In shelter medicine, what are the two best methods of identifying whether an animal is spayed or neutered?**
 - a. Ear tags
 - b. Abdominal tattoo
 - c. Heat branding
 - d. Ear-tipping
- 9. What type of diet is preferred for small-breed puppies?**
 - a. Low protein with more caloric density
 - b. High energy and high protein
 - c. Low protein and low energy
 - d. High protein with less caloric density
- 10. Animals that are under 16 weeks of age should not be fasted longer than _____.**
 - a. 6 hours
 - b. 8 hours
 - c. 4 hours
 - d. 12 hours