Infectious Disease Management in Animal Shelters

Section 1
Principles of Disease Management

1
Introduction to Disease Management in Animal Shelters

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SHELTER MEDICINE AS A SPECIALTY

The development of shelter medicine as a valued component of veterinary science reflects a variety of trends, including increased value placed on animals and a desire to seek alternatives to euthanasia as a response to companion animal homelessness; greater resources and sophistication on the part of animal-sheltering organizations, which create unprecedented opportunities for the design of quality facilities and health-care programs; and an explosion in the amount of evidence-based knowledge available to guide best practices for shelter animal care.

Although veterinarians have been working with shelters for years, it has only recently been acknowledged that this is a very complex field requiring special expertise. The first formal shelter medicine class at a veterinary college was offered by Cornell University in 1999; there are now shelter medicine programs, courses, and residencies offered at several universities. Many major veterinary conferences offer lectures in shelter medicine as well. There is an Association of Shelter Veterinarians whose membership is growing daily. As interest in the field steadily increases, more studies are being conducted to determine better ways of managing the health and welfare of shelter animals.

Roles of veterinarians in shelters

Veterinarians work with shelters in a variety of capacities as volunteers, employees, or consultants. The range of authority can be very broad. They may be on the high end of the chain of command as shelter directors or board members, or they may enter the shelter merely to provide per diem surgical or medical services. Many veterinarians fall somewhere in the middle as regular or part-time employees in charge of the health-care program.

Employment and consulting opportunities for shelter veterinarians are rising, and these opportunities represent rewarding and challenging options for professional practice. However, currently only a small percentage of veterinarians have a specialized background or expertise in this area. There is a great need to expand learning opportunities so that veterinarians may better serve shelter populations.

Herd health approach to shelter medicine

Simply stated, shelter medicine is herd health medicine for companion animals. The design of a comprehensive program to control, manage, and reduce the transmission of disease in animal shelters is a challenge for the veterinary professional. Current traditional clinical veterinary education focuses either on the design of cost-effective herd health protocols that emphasize disease prevention and maximize the production of animal products for food or that deliver sophisticated and potentially costly health care to individual companion animals. Shelter medicine requires a blend of these two approaches. Often the care of each individual shelter animal is best served by rigorous attention to the wellness of the group as a whole. When disease transmission is prevented, individual animals are spared serious illness that otherwise might not be treatable. When the population as a whole is healthy, more resources are available for those individuals requiring an additional level of care.

Another key historical difference in the two approaches to clinical practice revolves around the emotional bond and value attached to companion animals that do not exist to the same degree in large animal agricultural practice. This bond has a major impact on the ability to deliver science and evidence-based management

recommendations to shelters. In the past, euthanasia was the primary tool for managing population numbers and disease in shelters, just as slaughter is often used to manage disease in large animal herds. The increasing rejection of the routine use of euthanasia by animal shelters can be traced to a number of factors, the human–animal bond being at the forefront. Although animal welfare groups may complain that companion animals are considered "disposable," many people view them as family members. The same unprecedented interest in applying the latest medical advances to improve the health and well-being of companion animals applies to shelter animals as well.

Shelter medicine seeks to combine herd health management strategies and principles with individualized animal care in a way that has not been done before. Confronting shelter medical problems can therefore present a true quandary for the well-meaning companion animal practitioner who lacks a background in either herd health or shelter management. Conversely, the large animal herd health practitioner who tries to apply traditional methods of outbreak management in a shelter (i.e., depopulation, closing the herd down, and testing all newcomers) will find that in many cases these strategies will be rejected outright. This textbook was conceived to help veterinary professionals sort through the haze to find effective, acceptable, and workable solutions to disease problems and to promote health and wellness in shelter environments.

Unique aspects of the shelter environment

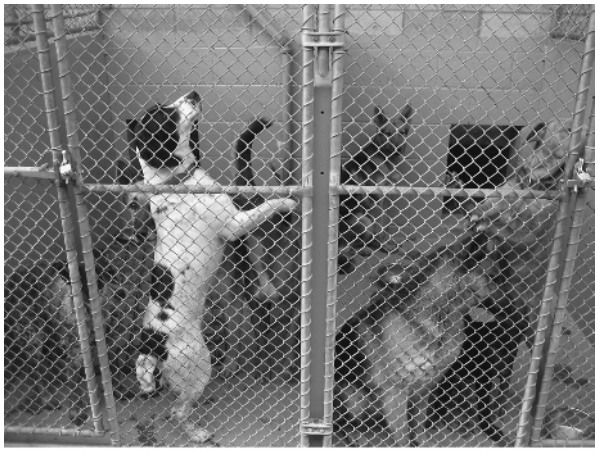
One might argue that the design of herd health care for companion animals is not new, and that shelter medicine does not require all this attention. It is true that some of the basic principles of disease control that have been utilized for managing kennels, catteries, and research laboratories apply in shelters, but significant differences exist. The goals of breeding and research facilities can be uniformly defined, whereas animal shelters have unique goals and challenges related to their varied missions. Differences and fluctuations in funding, resources, philosophy, training, governance, and even community attitudes towards the shelter all play roles in the functioning and priorities of shelter health programs. Husbandry practices must often be implemented in shelters that have never been applied in any other communal housing situation, thereby forcing shelter veterinarians to be innovative, resourceful, and courageous in their decision making.

The disease prevention component of shelter medicine is integrated into a complex health-care program that extends far beyond simple recommendations about vaccinations and deworming. The range of knowledge and experience required to design a comprehensive shelter wellness program can be quite daunting. The health aspect of animal sheltering intersects with virtually every other program within a shelter, including adoptions, volunteer programs, foster care, stray animal management, zoonotic disease control, cruelty investigations, and even design of the shelter building itself. In other words, few if any shelter programs are not directly or indirectly affected by animal health considerations. In addition to an in-depth knowledge about infectious disease, shelter veterinarians must be knowledgeable about several other disciplines, including sanitation, animal behavior, nutrition, husbandry, stress reduction, data collection, veterinary forensics, high-volume, high-quality spay/neuter techniques, and so much more. For more comprehensive information about shelter medicine and shelter operations, the reader is referred to *Shelter Medicine for Veterinarians and Staff* by Miller and Zawistowski, and to www.sheltermedicine.com, the Web site of the Koret Shelter Medicine program at the University of California, Davis, School of Veterinary Medicine. Additional resources are listed in Appendix 1.1. Most of the information in this introductory chapter will be covered in more detail in Chapters 2, 3, and 4 on wellness, outbreak management, and sanitation, and in each of the various other chapters. This chapter serves as an overview and introduction to the concepts necessary for designing an effective health program.

SHELTER MISSIONS AND GOALS

As noted above, an understanding of the shelter's mission is critical to the design of an effective shelter health program. A medical program that keeps animals healthy but fails to help meet the major goals of the organization – such as adoption of animals, increasing spay/neuter rates in the community, or reducing euthanasia – cannot be considered a complete success. Even advising on management of an outbreak or treatment of an individual animal requires an understanding of that particular shelter's goals and resources, both in general and for that individual animal or situation.

The American Society for Prevention of Cruelty to Animals (ASPCA) Community Outreach department estimates there are between 4,000 and 6,000 animal shelters in the United States alone. It is a mistake to assume that all shelters have identical goals. Although there is often an overlap in the provision of services, shelters tend to fall into two basic categories: they are either municipal shelters charged primarily with animal control responsibilities, or private, nonprofit shelters. Some communities have



1.1

1.2

Figures 1.1. and 1.2. Shelter resources, design, and mission vary widely. Figure 1.1 shows an overcrowded colony kennel for dogs. Figure 1.2 shows an enriched communal space for cats.

multiple shelters, both municipal and private, while others do not have shelters at all.

Not all shelters focus on adoption and rehabilitation of homeless animals. The allocation of municipal shelter resources may emphasize stray animal capture, protection of public health, complaint resolution, and law enforcement, whereas the private animal welfare organizations may dedicate larger expenditures to vaccinate, deworm, test for disease, treat, and neuter animals for rehoming. However, there is an increasing tendency for municipal as well as private shelters to work toward an increased adoption rate; seek alternatives to euthanasia as a strategy for disease management; and develop programs that emphasize public outreach and prevention of problems that lead to relinquishment. There is great variation within private shelters as well, ranging from those that provide lifelong sanctuary to a limited number of animals to those that accept all animals presented and euthanize those they are unable to place, and many variations on these strategies. Some of the different types of shelters are described in more detail below.

Just as it is important not to judge clients by their appearance, the breed of their pet, or the vehicle they drive, it is not advisable to make assumptions about shelter philosophy or resources based on shelter type, title, location, or history. Priorities may change and opportunities emerge with changes in management or philosophy. Even the smallest or poorest shelter may prioritize adoption, utilize progressive spay/neuter, volunteer, foster or other programs, or pursue alternatives to euthanasia for management of disease. Even if these possibilities are not available immediately, shelters may incorporate them into future plans. Therefore, all options should be offered to shelters and ideal standards explained, just as they would be for any patient. Figures 1.1 and 1.2 depict shelter housing for dogs and cats.

Municipal shelters

It is a common belief that most municipal shelters operate chronically overcrowded, underfunded programs located in dilapidated facilities in undesirable sections of the community. While this model does exist, animal sheltering has undergone a fundamental change in many communities over the past 20 years as the human–animal bond strengthens and society becomes less tolerant of animal abuse and neglect. Shelters of all types have experienced increased internal and external motivation to upgrade the quality of care they provide. There has been a varied response to this pressure: many communities are renovating, retrofitting, and building new facilities with the latest innovations, consulting with veterinarians, expanding staff and services, etc. Veterinary expertise is required to effectively implement many of these changes.

Municipal shelter functions historically focused on stray animal pickup, control of dangerous animals, including quarantines of animals that may have bitten someone, capture of free-roaming animals, nuisance complaints,

investigation of animal cruelty complaints, handling of wildlife, etc. They may also offer adoptions, low-cost spay/neuter and vaccination clinics, humane education, and an assortment of volunteer, foster care and other community programs. Most municipal shelters are mandated to accept all animals regardless of their capacity to find homes or take appropriate care of them, and utilize euthanasia regularly for animals that cannot be safely placed for adoption and as a tool to manage the population numbers as well as disease.

Private shelters

Private shelters are generally chartered as 501(c)3, not-for-profit organizations; they are privately funded and their policies are often set by elected or volunteer boards of directors. Private shelters may incorporate the words "humane society" or "SPCA" in their titles, but most private shelters operate independently and are not related to each other, nor are shelters titled "SPCA" related to the ASPCA. Some private shelters contract to provide animal control services to local government entities (county or city), although an increasing number have relinquished animal control contracts to focus on adoption, spay/neuter, behavior, and humane education programs.

One of the latest ongoing trends in animal sheltering is for humane societies to adopt policies known as "no kill," meaning they will not euthanize adoptable animals for lack of space to house them. This has a major impact on animal care programs: "no kill" organizations or limited admissions facilities may restrict their admissions and hold animals for longer periods, which can create unique challenges for maintaining animal health and mental wellness. Studies in United States shelters have shown that the longer animals remain in a shelter, the more likely they are to become sick, although a recent study completed in shelters in the United Kingdom showed the opposite trend with respect to feline upper respiratory infection (Edinboro, Janowitz, et al. 1999; Edinboro, Ward, et al. 2004; Edwards, Coyne, et al. 2008). This illustrates the impact that variations in shelter environments, management practices, and even cultural attitudes can have on animal health.

A great deal of variation can be found even within the scope of private shelters with similar titles. It should be noted that few if any descriptive terms can be assumed to have consistent meaning across all shelters. The term "no kill" is just one example. Some shelters that use this term do perform some euthanasia, while some shelters that follow similar policies to those commonly found in "no kill" shelters (e.g., they limit intake and/or do not perform euthanasia for population control) do not use the term.

Other types of shelters

Not all shelters can be categorized as either strictly municipal or private. In addition to private shelters that accept the contract to provide municipal services, some municipal shelters solicit private donations to provide services not mandated or paid for by their contractual arrangement with the municipality. Other foster care and rescue groups may work out of private homes or focus on a specific breed, age, or special needs animals. They often work closely with shelters to rescue animals that can be rehabilitated and placed for adoption if provided with veterinary and behavioral care that cannot be offered by the shelter. A limited number of sanctuaries also exist that will provide lifelong care for animals that cannot be successfully or safely adopted.

REGULATION OF SHELTERS

There is little, if any, accountability of shelters to any particular entity. There is no parent organization to which all shelters belong: the ASPCA and the Humane Society of the U.S. (HSUS) are autonomous, independent organizations that do not oversee or run local SPCAs, humane societies, or other animal rescue or adoption organizations. Most states do not regulate shelters, nor does the federal government. Only a few states have minimum standards of care for animals in shelters. Regulations pertaining to shelters are often limited to providing guidelines for euthanasia and mandating holding periods for stray animals and bite cases. However, the shelter veterinarian should become familiar with relevant local laws, as there is an increasing trend towards greater regulation and scrutiny of many aspects of shelter practice.

Requirements for data reporting

While a few states do require reporting of certain statistics related to animal intake and disposition, this is not generally the case. Even the number of shelters operating in the United States is unknown. In addition to the lack of reliable data regarding the number of shelters in this country, the lack of reporting requirements makes it difficult to accurately determine the number of animals admitted or euthanized in shelters, or to establish norms for disease rates or other important measures of shelter animal health. However, while national or international figures remain elusive, individual shelters and communities are becoming increasingly sophisticated in tracking important data related to the well-being of animals in their communities. With the widespread use of computerized, and in some cases Web-based, shelter database programs, pooled data

collection and analysis from multiple shelters may become increasingly possible in the future.

SHELTER CHALLENGES

Any veterinary professional who is working with a shelter must have an understanding of the obstacles and challenges the shelter faces in order to design an effective and comprehensive program that combines preventative health-care strategies with wellness protocols. Whatever the shelter's particular mission, one goal of every shelter should be to provide a clean, healthy, and safe environment that supports the maintenance and improvement of the health of all of its residents, regardless of the length of their stay or ultimate fate. Some of the issues that must be dealt with in order to achieve these goals will be touched upon briefly in this chapter.

Shelter resources

Shelters, regardless of their mission or type, are often limited in the resources they can offer to provide animal control and welfare services. Human and animal services must often compete for sparse municipal funding, and private fundraising efforts may be insufficient to meet the targets and needs of the shelter program. Veterinarians can best serve shelters by advising on allocation of limited resources for maximization of shelter animal health in the context of the shelter's overall goals and mission. Even with limited funding, shelters can maintain a healthy environment for the animals with meticulous attention to management of population numbers, good sanitation, prompt isolation of diseased animals, stress reduction, and other practices described in this chapter and elsewhere in this text.

Veterinarians should take a broad view when advising on resource allocation in shelters. In many cases, when all costs are considered, prevention of illness is not only more humane for the animals and preferable for public health, it is more cost effective than the alternative. Even apart from ethical considerations, a modest investment in vaccination, diagnostic testing, or sanitation will be amply repaid if more animal lives are saved and more animals are adopted as a result: adoption fees can offset some of the costs of care, while the costs associated with euthanasia and disposal can be substantial. Thus the best approach for animal health and adoption can also prove to be a sound financial choice, especially when preventive measures are emphasized.

Fortunately, many of the practices that enhance shelter animal health are no more costly than less effective practices. For example, as described in Chapter 5 on vaccination and immunology, vaccinating animals at the time of admission is far more likely to confer protection than vaccinating them a few days or even a few hours later, and costs no more. In some cases, best practices are actually less expensive than the alternative. For instance, Chapter 4 on sanitation describes in-residence or "spot" cleaning as a preferred method of cleaning for cat cages. This takes less time and utilizes fewer costly chemicals than more intensive daily disinfection, while potentially reducing stress and limiting disease transmission among cats.

If resources are so limited that basic practices to protect animal health cannot be implemented, this should be brought urgently to the attention of management, funding entities, and the public. The inability to limit disease spread in the shelter can have substantial implications for public and community animal health as well as the welfare of sheltered animals, and should not be tolerated as a long term situation. Figure 1.3 is an example of inadequate care being provided to a puppy suffering from parvovirus.

Even shelters with ample resources may encounter problems if there is a failure to align expectations with the available facilities, staffing, and funds, with consequent compromises to animal and human health. Many ambitious and well-intentioned organizations, public and private, strive to take in more animals than they can properly care for, and the results are dirty, malodorous, overcrowded facilities with diseased and possibly dying animals. This in turn leads to animal pain and suffering, decreased visits from potential adopters, bad public relations (especially if there are disease outbreaks or diseased animals being released from the shelter), and increased

Figure 1.3. A fundamental goal of shelter health programs must be prevention of suffering. This puppy with parvovirus is suffering from inadequate care.

mortality and euthanasia rates. In some cases, shelters have actually been charged with cruelty to animals for their failure to provide the appropriate food, water, shelter, and veterinary care that is necessary to prevent suffering.

To prevent such harmful scenarios, veterinarians and managers should work together to perform a realistic assessment of how many animals can be humanely housed in the facility and then allocate resources to provide appropriate care and humane treatment. This forms the foundation for implementing many other practices described in this text: preventing disease, mitigating stress, and responding to outbreaks without resorting to depopulation are all far more readily accomplished when the shelter's fundamental capacity is not exceeded. Limiting the population within the shelter need not lead to any increase in euthanasia or decrease in the number of animals adopted. As described in Chapter 2 on wellness, population within the shelter can be limited either by reducing intake and/or by moving animals more rapidly through the shelter. Maintaining animal health is one powerful tool to ensure that animals move through the shelter to adoption without delay. Other methods to decrease shelter crowding include appropriate use of foster care and rescue groups, animal transport and transfer programs, and proactive adoption efforts that do not rely on shelter crowding as a trigger. Attentive management is the foundation of optimizing these programs, and is described in more detail in Chapter 2 on wellness. Although immediate results may not be seen, long-range strategic planning should aim to reduce intake through shelter and low-cost spay/neuter programs that are accessible to the community. The improved animal health and shelter conditions that result from working within a shelter's true capacity may actually lead to an increase in adoptions as well as improved quality of life for shelter animals and staff.

Shelter administration

As tempting as it may seem, it would be inappropriate to label all the problems in shelters as a by-product of inadequate funding. One potential barrier to an effective shelter health program is a lack of communication and understanding between the veterinarian and the shelter's management. Although it is increasingly recognized that the veterinary component forms an integral part of the overall shelter management team, some shelters still separate the medical program from general shelter operations, not realizing the impact of animal health decisions on all aspects of the shelter's programs. This segregation can result in misunderstandings that lead to shelter veterinarians being accused of being unsympathetic to the plight of the animals, not understanding the shelter's goals or problems, or of outright incompetence and cruelty when difficult health-care decisions are made that are not popular with staff or in keeping with past practices.

To help avert some of these issues, the role and expectations for the veterinarian should be clearly defined within each individual shelter (Miller 2007). It is important to establish chains of command, determine which areas are the domain of the veterinarian, and create levels of authority and decision making. For example, will the veterinarian determine which animals are suitable for adoption? How are euthanasia decisions made? Who performs behavior assessments? Who selects the diet? Who determines the movement of the animals within the facility or deployment of staff?

In some cases, shelter personnel may cling to the idea that certain elements of the shelter health-care program do not need the involvement of veterinarians. This may be particularly true if there has been a history of less-than-successful communication with community veterinarians who had limited knowledge of shelter considerations and constraints. However, staff should be made aware that stress reduction, sanitation, population management, facility design, etc., all require veterinary input as much as do conventional medical decisions about vaccinations and anthelmintics. The restriction of the veterinarian to medical decisions only without any role in strategic planning, administration, training, or management can render implementation of new health-care protocols difficult for everyone involved. To be effective, shelter veterinarians should be an integral part of the management team with the authority to make or participate in decisions on all matters that pertain to animal health and welfare. If the veterinarian is not a member of the management team, a clear method should be developed by which management and veterinary staff can communicate routinely regarding issues of mutual concern.

Problems may also arise when shelter staff consult with local practitioners who are uninformed about the differences between private practice and shelter medicine and are therefore critical of practices recommended by shelter veterinarians, especially when taken out of context. Although there is increasingly widespread awareness of shelter medicine, some private practitioners may still apply their standards of care to shelter animals, not realizing that the different recommendations regarding vaccinations, treatment, spay/neuter, etc., for this population are based on a different set of risk factors, assessment tools, circum-

stances, and resources. This different standard of care should not be interpreted to be lower but rather to be shelter specific, just as there are different but effective standards of care for large animal herds.

Shelter medicine is still in its infancy when compared to most other veterinary specialties; some practitioners are unaware of its existence or the existence of various resources designed to help them deal with the unique dilemmas often encountered in shelters. Whenever a new specialty is evolving, it should be expected that there will changes and updates of philosophies and practices, and indeed even disagreements among the "experts." Changes in or conflicting recommendations among shelter experts regarding shelter practices should not be seen as errors in judgment; changing priorities and population demographics, new research, and emerging diseases require that veterinarians be flexible in reassessing programs and permitted to change protocols without fear of recrimination. In recent years, several routine beliefs and common practices have come under increased scrutiny, especially as new research that is applicable to or targets shelters is performed. Just a few of these question marks include the routine use of quarantine for newly admitted animals, the value of footbaths under most circumstances, the role of aerosolization of certain pathogens in disease transmission, the importance of daily disinfection of cat cages, the value of a minimum number of air exchanges for good ventilation, and so on. These topics are all tackled in various chapters in this text, but it is clear that more studies that target shelters are needed.

Disease transmission

It is essential to have a thorough understanding of how disease is transmitted in order to design a program that can halt its spread in shelters. Each chapter in this textbook will address modes of transmission for the specific disease being discussed. While direct contact, droplets, and aerosolization play key roles in disease transmission, the most common method of spreading disease in shelters is via fomites. In addition to knowing which species (including humans) are susceptible to the pathogen, it is also critical to know the routes of shedding, i.e., in urine, feces, nasal, and ocular secretions, etc. When designing a sanitation program, staff and volunteers must be educated about the significant role they play in spreading disease via their hands, clothing, or other inadequately disinfected fomites and equipment. Workers are much more likely to adhere to strict guidelines regarding sanitation if they understand the consequences associated with taking shortcuts or failing to comply. (See Chapter 4 on sanitation.)

Incubation period, shedding, and carrier states

Attention must be paid to the incubation period, duration, and pattern of shedding and carrier states when addressing disease control. Knowing the incubation period helps determine whether an animal entered the shelter with a disease or acquired it in the facility. This information is essential for organizing appropriate quarantines, sanitation procedures, and other outbreak management strategies. For example, lack of knowledge about the viral shedding pattern of parvovirus can lead to serious problems if susceptible animals are exposed to recovered patients who may still be shedding virus. It is also essential to know about parvovirus shedding patterns for accurate antigen test interpretation and an understanding of how recent vaccination may affect the test. The control of feline upper respiratory infections in shelters can be especially frustrating if veterinarians are unaware that both herpesvirus and calicivirus have inapparent carrier states and that herpes recrudesces approximately 1 week after a stressful incident. This information is covered in more depth in each respective disease chapter.

Shelter design

There is no doubt that many shelters are housed in facilities that do not meet their needs. They are often found in buildings that were originally designed for purposes other than animal care, such as factories and warehouses. The shelter may have been designed at a time when the population demographics were different, or the shelter's mission may have dramatically altered since the facility was originally designed. Shelters that prioritize adoption and hold animals longer may find that they do not have adequate space to provide for isolation if animals become sick and require treatment. They may not have sufficient space to provide for the animal's emotional well-being as well as its physical needs, such as exercise and play space, grooming areas, etc. Shelters that were originally designed primarily to handle dogs or litters of puppies may now find the population has shifted to cats, kittens, and adolescent dogs with problem behaviors. Normal wear and tear on the building can create cracks and crevices on concrete surfaces that make disinfection difficult.

In order to implement a successful disease control program, physical and design flaws in the shelter should be addressed promptly whether through renovation or retrofitting. In some cases, it may be necessary to explore the need for capital improvements or even construction of a new facility in order to most effectively meet the shelter's overall mission and provide a safe, healthy environment for the animals. However, a dilapidated facility should

never be considered an "excuse" for poor animal care. Many steps can be taken to maintain animal health even in a building that is far less than ideal. Vaccination on intake, provision of toys and bedding, and careful population monitoring for disease are just a few examples of important components of a wellness program that are not building dependent. (See Chapter 2 on wellness.)

Special considerations for shelter facilities

The design of animal shelters varies substantially from that of veterinary hospitals, breeding facilities, or laboratories. A properly designed shelter should be versatile enough to adapt to the various situations that it may have to deal with, whether it is a disease outbreak or the sudden influx of animals seized from a hoarding situation or disaster response. Instead of a few large, open areas for housing animals, there should be several smaller areas that can be adapted as needed for isolation, quarantine, or other specific uses. Traffic patterns in the shelter should be simple and direct people and animals from areas with healthy and juvenile animals first to areas housing high-risk or diseased animals last.

All areas in the shelter that house animals should have adequate drainage and be constructed of nonporous, durable materials that can withstand repeated applications of hot water, detergents, and disinfectants. The materials used routinely in veterinary hospitals are often selected as much for their aesthetic value as for practicality and may not be able to withstand the rigorous sanitation protocols employed by shelters.

One of the keys to managing the health of a confined population is to make certain there is adequate ventilation in the facility. Ventilation should be measured at the level of the animals; ambient room temperature should be species appropriate, comfortable, and avoid fluctuations. The value of fresh air, sunshine, indoor/outdoor runs, and open windows should not be underestimated. Many shelters resort to the use of fans and high-efficiency particulate air (HEPA) filters, and take other variably effective measures to augment deficiencies in their ventilation systems.

Other shelter design considerations include the use of materials that reduce noise; communal housing as well as individual cages; runs with guillotine doors that facilitate the safe cleaning of enclosures with dangerous dogs; housing for species other than dogs and cats; food preparation, laundry, and storage areas; and euthanasia facilities. Because of the special needs of shelters, it is advisable that architects and contractors who are experienced with shelters be consulted whenever designing or retrofitting a shelter. Issues related to shelter environment and design are covered in greater depth in Chapter 2 on wellness.

Sanitation

One of the cornerstones of any shelter health program is its sanitation program. This principle is discussed in every chapter. The sanitation program should be tailored to each particular shelter environment, with attention to the training and knowledge level of staff, surfaces to be disinfected, level of repair (or disrepair), and common disease problems in that shelter's population. Even in less-than-ideal circumstances, a reasonably effective program can almost always be designed. The goal should be to remove as many pathogens as possible through vigorous cleaning of all contaminated surfaces and potential fomites with hot water, soap, and degreasers, and then to use the appropriate disinfectant to inactivate whatever pathogens remain. The veterinarian's role in the design of the sanitation protocol extends far beyond the selection of the proper disinfectant and writing down a few instructions. Staff training and periodic review and updating of procedures should occur regularly; hands-on review of sanitation procedures should be a priority whenever handling a disease outbreak. Sanitation protocols are covered in depth in Chapter 4.

Stress

The role of stress in disease transmission is well established in both human and veterinary medicine. Unfortunately, it is frequently overlooked by many shelter employees and managers who are busy cleaning cages or attending to other more visible needs. The importance of controlling stress cannot be emphasized enough. Stress has a powerful impact on animal well-being. It may result in behaviors that decrease an animal's chance of adoption, and many diseases are recognized as being indirectly or directly associated with stress. In addition to broad effects on immunity and susceptibility to disease, of particular importance in shelters is the link between stress and reactivation of herpesvirus in cats leading to upper respiratory disease signs. Stress can also cause symptoms and lesions that are indistinguishable from true clinical disease such as depression, diarrhea, vomiting, acral lick nodules, etc. The role of stress in disease transmission and ways to minimize its impact on the shelter population are discussed in Chapter 2 on wellness.

Treatment, adoptability, and euthanasia

No decisions in the shelter are fraught with more anxiety, heartache, frustration, anger, and dissension than those

involving euthanasia. One of the challenges that faces shelters is deciding when and how to treat disease when it occurs. Many infectious diseases that are not inherently dangerous or life threatening to individual animals, such as ringworm or upper respiratory infections, pose true ethical and moral dilemmas for shelters that do not have the resources to treat or otherwise manage them. These fairly benign diseases may be deadly in the shelter because they may be either zoonotic or highly communicable. It can be extremely difficult for shelter staff or the public to understand that managing to save the lives of a few affected animals sometimes consumes precious resources that could otherwise be used to save more lives. If appropriate isolation facilities or sufficient staff are not available, care of diseased animals can endanger the lives of many others by exposing them to infection. On the other hand, being able to treat at least some animals can enhance morale and public support as well as result in better disease reporting on the part of shelter staff and volunteers. Ideally, preventive programs should be implemented so that animals will stay healthy, and thus not require treatment, and isolation facilities or other alternatives (e.g., off-site care) are planned and designed so that treatment can be safely and humanely provided. In the meantime, it can be a delicate balancing act between implementing measures that benefit the individual animal and yet protect the lives of the entire population.

Monitoring and measuring shelter animal health

Although much attention has been paid in recent years to measurement of outcomes such as adoption and euthanasia, less focus has been directed to measures that reflect the health or well-being of animals within the shelter. This is unfortunate, as it is difficult to identify emerging problems before they become severe, communicate challenges or success to stakeholders and the public, or judge the relative value of various investments in animal health without a plan for systematic measurement. Conversely, a system that documents the impact of procedural changes on disease control can help bypass much argument and enhance staff compliance. For example, if a change in cleaning procedure or vaccination practices can be demonstrated to have a positive impact on animal health, the additional cost and effort associated with this practice will be more readily accepted. A detailed description of disease surveillance systems is beyond the scope of this chapter, but several brief examples will be given below. More information on strategies for data collection and analysis in shelters is available in the textbook *Shelter Medicine for Veterinarians and Staff*.

Counting the number of cases of disease

One of the most straightforward measures of shelter animal health is simply the number of cases of disease that occur over time. This requires a consistent case definition and a system to detect and record disease occurrence. In some cases, this can be accomplished through correctly used shelter software systems, provided a field exists to record a unique diagnosis linked to a date on which the diagnosis was made. The number of cases can be reported in relationship to the number of animals admitted during the same time period, the number of total "days at risk" (the number of animals present each day who are potentially susceptible to the disease in question), or ideally both.

The number of cases can be monitored for every disease or syndrome of concern, or only for a few "marker" diseases. For example, upper respiratory infection/kennel cough (URI) is the most common disease problem for cats and dogs in many shelters. Differences in URI levels over time can be relatively easy to detect compared to more sporadic conditions such as parvovirus or feline panleukopenia. An increase in URI can be used as a red flag that the population may be at risk for an outbreak of more serious disease. Conversely, a change in cleaning, housing, or other practices that leads to a reduction in URI is likely to reduce the risk of other disease problems as well. More detailed information about disease surveillance for URI can be found in Chapter 8 on feline upper respiratory disease.

Shelter-acquired disease leading to euthanasia

In addition to counting cases of disease, many other measures of health are available. Perhaps one of the most important for shelters that perform euthanasia is the number of animals that arrive at the shelter in a "healthy, adoptable" condition and are later euthanized due to shelter-acquired illness. If an increasing percentage of animals fall into this category, it should be cause for serious concern. This can be reported by commonly used shelter software systems provided intake status and outcome fields are used correctly with the goal of tracking these data in mind.

Sick animal care days

Another important and accessible measure of shelter population health – and the cost associated with treatment rather than prevention – is the number of "sick animal care days." Sick animal care days can be determined by obtaining a daily tally, either by hand or by computer report, of all sick animals each day and adding this over time to provide the monthly and annual number of days

caring for sick animals. Alternately, this figure can be derived by tracking the duration of disease and adding disease duration for each case over time; again this may be accomplished by hand or computer report, provided date of onset and outcome are reliably entered.

Even if sick care days for only one disease, such as URI, are tracked, this can be very helpful as a likely reflection of overall shelter health. When the number of sick care days is multiplied by the average daily cost of care, an estimate can be made of the true cost of disease. In this context, investment in preventive measures may be more readily justified. For instance, an initial investment in cat housing that is likely to significantly reduce feline URI may be rapidly repaid in reduced staff time and costs associated with caring for ill cats.

Shelter death rate

The number and percentage of animals that die (as opposed to being euthanized) in the shelter or foster care is perhaps the starkest potential indicator of urgent shelter health problems. This number should be tracked carefully, separately from all other "outcome" categories, and monitored over time. Monthly numbers should be compared to the same month for previous years, as death rate is normally liable to climb slightly in summer months in conjunction with kitten season. A small, informal survey of shelters by author Hurley revealed an average annual death rate of 0.75% (range 0.18–1.61%). Shelters with relatively high annual intake reported death rates toward the high end of this range. Death rates of over 2% to 3%, or any increase in death rate, should be cause for close examination. While increased death rates may occasionally arise as a result of a positive policy change (such as addition of a foster program for neonatal kittens, which are prone to relatively high mortality rates), the effect of increased animal death on foster, rescue, and adopter morale should be recognized and addressed even under these conditions. The circumstances of *each death* within the shelter or foster care should be carefully investigated and documented, including whether or not the animal was healthy at the time of admission; whether and when health problems were noticed or diagnosed; whether the animal was receiving appropriate treatment for the condition that caused its death; the location of death (specific area of shelter or foster care); how many days the animal was in the shelter (healthy and sick) before death; and the reason for death if known. Even a small increase in the number of animals admitted healthy and dying of shelter-acquired disease should be viewed with grave concern.

Other indicators of shelter animal health

Other measures of health include the number of valid health-related complaints received after adoption; the number of recheck appointments seen for shelters that have a postadoption care program or the number of claims for pets insured under a shelter pet health insurance plan; days from intake to vaccination; number of vaccines used compared to number of animals admitted (if fewer vaccines are used than animals admitted, this suggests that not every animal is getting vaccinated); number of daily treatments; and amount of drugs used and cost thereof. Changes in these numbers should be analyzed in context. For example, an increase in the number of treatments, cost or amount of drugs used is not necessarily a bad sign. However, if this occurs not because of a specific plan to increase the range and type of treatments available but rather because more animals are entering healthy but later developing illnesses that require treatment, it suggests a breakdown in prevention that should be addressed.

Although the establishment of health monitoring systems may seem daunting in a busy shelter environment, this information should be considered a vital underpinning to a functional shelter health program. Just as individual animals cannot be diagnosed and treated without performing a physical exam and obtaining other measures of health, blindly investing in health practices directed at a population is likely to be suboptimally effective at best. Ultimately, a well-designed health measurement system is a humane and cost-effective investment, as it directs shelter management and veterinarians to the most successful methods of maintaining animal wellness and quickly identifies problems.

SUMMARY OF SHELTER HEALTH PROGRAMS

There is no one single health-care protocol that is appropriate for every shelter. Programs should be custom made for each facility based on its goals, needs, and resources. The shelter health-care program itself should consist of several components. Minimally it should include physical examination of the animals on admission by medical staff or trained shelter personnel, vaccinations on admission, external and internal parasite control, well-managed foster care programs for underage animals or those with special needs, daily rounds, disease testing, isolation or removal of sick animals, prompt treatment to alleviate pain and suffering, and euthanasia when appropriate. Spay/neuter programs will not be covered in this textbook; although

they are a key component of many shelter health-care programs, they are not considered part of disease management. The importance of conducting a realistic assessment of the needs of the community and animals in order to allocate resources appropriately cannot be stressed enough. For example, routine feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) testing of every cat before adoption may not be the best use of resources in shelters that have a high turnover, euthanize for space, or house animals in individual cages. Testing all cats for these viral infections makes more sense for shelters that have low turnover, house animals long term or group house, or adopt out virtually all animals. Allowances should be made for budgetary adjustments required during a disease outbreak, for example, when disease testing or use of a more expensive or different vaccine or disinfectant becomes a priority. There should be a written health-care plan that undergoes regular reassessment and revision as conditions change. In terms that are analogous to agricultural herd health, instead of producing a healthy animal product for food consumption, the goal of shelter health programs is to provide a clean, safe, enriched environment for homeless animals that functions as part of the shelter's overall mission. More details on the overall approach to shelter animal health are provided in Chapter 2 on wellness.

CONCLUSION

Shelter medicine is a challenging and rewarding field of veterinary medicine. The prevention of disease transmission and creation of effective wellness protocols require a multidisciplinary approach that is best achieved by a management and veterinary team that works together and understands the shelter's and the community's goals, limitations and opportunities, and respects the strengths and weaknesses of the team members. The ensuing chapters in this textbook will provide in-depth information on some of the concepts that were introduced here to help veterinarians offer effective solutions to disease problems in shelters.

APPENDIX 1.1. SHELTER MEDICINE RESOURCES

Documents

Richards J, et al. 2006. The American Association of Feline Practitioners Feline Vaccine Advisory Panel Report. *JAVMA* 229(9):1406–41. www.catvets.com/professionals/guidelines/publications/?Id=176.

American Animal Hospital Association 2006 Canine Vaccine Guidelines – Revised www.aahanet.org/PublicDocuments/VaccineGuidelines06Revised.pdf.

American Association of Feline Practitioners and American Animal Hospital Association Basic Guidelines of Judicious Therapeutic Use of Antimicrobials. http://www.avma.org/issues/policy/jtua_aafp_aaha.asp

Books

Greene CE, ed. 2006. *Infectious Diseases of the Dog and Cat*, 3rd edition. Philadelphia: WB Saunders Co.

Peterson C, Dvorak G, Rovid-Spickler A, eds. 2008. *Maddie's Infection Control Manual for Animal Shelters for Veterinary Personnel*. Ames, IA: Center for Food Security and Public Health, Iowa State University College of Veterinary Medicine.

Rhoades R. 2002. *The Humane Society of the United States' Euthanasia Training Manual*. Washington, D.C.: Humane Society Press.

Miller L, Zawistowski S, eds. 2004. *Shelter Medicine for Veterinarians and Staff*. Ames, IA: Blackwell Publishing.

Colleges of Veterinary Medicine with Shelter Medicine Programs

Contact regional colleges for diagnostic laboratory services and to determine if a shelter medicine program exists and can be of assistance. Several colleges now have programs, including the following as of this writing:

Colorado State University College of Veterinary Medicine
300 West Drake Road
Fort Collins, CO 80523-1620
http://csuvets.colostate.edu/shelter_medicine.htm

Cornell University College of Veterinary Medicine
Ithaca, NY 14853–6401
http://www.vet.cornell.edu/MaddiesFund/

Iowa State University
College of Veterinary Medicine
Iowa State University
Ames, IA 50010
http://www.maddiesfundisu.org/

University of California at Davis
School of Veterinary Medicine
Davis, CA 95616-8782
http://www.sheltermedicine.com

University of Florida
College of Veterinary Medicine
2015 SW 16th Avenue Room V2-110
Gainesville, FL 32610
http://www.ufsheltermedicine.com

University of Pennsylvania
School of Veterinary Medicine

Department of Clinical Studies
Philadelphia, PA 19104

Other Organizations

The American Humane Association
http://www.americanhumane.org/site/PageServer

The American Society for Prevention of Cruelty to Animals
http://www.aspca.org/site/PageServer?pagename=aspcapro_home

The Association of Shelter Veterinarians
http://www.sheltervet.org/

The Companion Animal Parasite Council
http://www.capcvet.org/

The Centers for Disease Control and Prevention
http://www.cdc.gov/

The Humane Society of the United States
http://www.hsus.org/

National Animal Control Association
http://www.nacanet.org/

Society for Animal Welfare Administrators
http://www.sawanetwork.org/

Veterinary Information Network
http://www.vin.com/

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Edinboro CH, Janowitz LK, et al. 1999. A clinical trial of intranasal and subcutaneous vaccines to prevent upper respiratory infection in cats at an animal shelter. *Feline Practice* 27(6):7–13.

Edinboro CH, Ward MP, et al. 2004. A placebo-controlled trial of two intranasal vaccines to prevent tracheobronchitis (kennel cough) in dogs entering a humane shelter. *Prev Vet Med* 62(2):89–99.

Edwards DS, Coyne K, et al. 2008. Risk factors for time to diagnosis of feline upper respiratory tract disease in UK animal adoption shelters. *Prev Vet Med* 87(3–4):327–39.

Miller L. 2007. A blend of science and art: what every shelter should know about shelter medicine. *Animal Sheltering* January/February 2007:49–51.