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Introduction to Infectious Disease Management in Animal Shelters

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1.1 Why This Book?

Though many excellent veterinary texts on infectious disease have been published over the years, the first edition of this book was published in 2009 to fill a gap in understanding the specific challenges and solutions regarding infectious disease management in shelters. The risks in this context are abundant. Animals entering shelters are often unvaccinated, suffering from parasite infestation, poor nutrition and a variety of other stressors. Shelters house lost, unwanted and abused animals spanning every life stage, from neonates to geriatric pets, each with their own unique risks and requirements. Limited resources and outdated facilities, still found at many shelters, increase the difficulty of keeping these vulnerable populations healthy.

At the same time, the potential rewards of successful disease management in shelters are even greater than the challenges. Infectious disease in shelters has historically been a leading cause for euthanasia. But, in addition to being literally lifesaving, successfully treating individual animals, managing outbreaks, and most especially, preventing disease increases animals' welfare. Prevention of illness can also conserve precious resources

and free up space in the shelter that would otherwise be occupied by sick animals. In turn, the improved public confidence that a healthy population tends to generate can lead to greater support of the shelter, higher adoption rates, and an increased capacity to invest in programs to decrease shelter admission and keep pets healthy and safe with their families.

1.1.1 Fundamentals of Disease Control in Shelters

Though some unique considerations exist for shelters, the fundamentals of disease management rest on a familiar foundation. In veterinary medicine, it is customary to think about the "disease triad" that describes the interaction of pathogen, host and environment in determining whether disease occurs. Introduction of pathogens into a shelter is virtually inevitable; therefore, efforts focus on supporting animals' immunity and limiting disease spread within the environment.

This text will provide strategies to accomplish each of these goals with respect to specific pathogens commonly encountered in shelters, as well as general information on methods to support immunity and limit environmental

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spread (e.g. see Chapter 2 on Wellness, Chapter 9 on Canine and Feline Vaccinations and Immunology, Chapter 8 on Sanitation and Chapter 6 on Outbreak Management). The reader will find information that reflects the ways in which shelter-specific considerations result in recommendations that vary from the approach that might be recommended in another context.

For instance, maternally derived antibodies (MDA) in juvenile animals have both good and bad consequences: they provide initial protection against disease but also potentially block vaccines. Initial levels of MDA will determine the age at which vaccines can overcome this interference, and this information has historically guided vaccine recommendations for pet puppies and kittens born to vaccinated dams. However, it is now known that many juvenile animals entering shelters were either born to unvaccinated dams and therefore received no MDA (and therefore no potential for MDA interference); or were born to mothers who survived field strain infection and may have transmitted high levels of MDA (Lechner et al. 2010). This means vaccines may be effective either earlier or later in comparison to offspring of a vaccinated dam with an intermediate level of MDA to transmit. This, coupled with the higher disease exposure risk common to shelters, leads to the recommendation to start vaccination earlier and continue longer for puppies and kittens in a shelter environment.

Another example can be found in the treatment recommendations for dermatophytosis. Often a self-limiting disease of little consequence in privately owned pets, this zoonotic and environmentally persistent (and resistant) pathogen has historically been the cause of euthanasia in many shelters. However, protocols that limit environmental contamination through effective topical, as well as systemic treatment, have been developed to allow this condition to be managed successfully at an increasing number of shelters (Newbury et al. 2011).

1.1.2 The Production Medicine Model

For all its benefits, infectious disease control is only one goal of a successful shelter medical program. The production medicine model, developed in the context of commercial animal husbandry enterprises, proves surprisingly applicable here. The successful livestock veterinarian understands their role extends beyond treatment or even prevention of disease. Rather, they provide guidance to help the production system reach a variety of goals, which may include such things as providing a healthy, safe food product, ensuring that the enterprise is financially sustainable, providing good welfare and maintaining compliance with relevant regulations. None of these goals may be reached at the expense of another.

Similarly, the shelter practitioner must approach the task of disease control with an understanding of the mission of the organization, its goals, requirements and priorities. The true art of shelter medicine involves balancing risks to best serve overall objectives, especially those that are potentially in conflict with one another. Balancing isolation and confinement for infectious disease control with allowing exercise, social interaction and contact with adopters is just one example.

The recommendations in this text aim to highlight some of the ways in which risk and reward balance in a shelter vary in comparison to other contexts. Methods are suggested to mitigate risks while maximizing the shelter's ability to meet their goals. Paradoxically, veterinarians can sometimes best contribute to overall shelter success by recommending practices that are seemingly *less* cautious rather than more when it comes to infectious disease control. For instance, routine quarantine of healthy-appearing incoming animals is commonly recommended in herd-health contexts to screen for animals that may be incubating disease. However, the increased length of stay (LOS) this practice entails, along with the increased population density as well as the cost

and staff burden that results, often undermine other goals of the shelter such as judicious use of limited resources and rapid movement of healthy animals into adoptive homes. Alternative strategies to limit disease introduction, without the need for quarantine, include accurate history taking when possible, the performance of careful intake exams and vaccination, daily rounds and monitoring, optimized sanitation procedures and appropriate and prompt use of diagnostic testing. These topics are covered in more detail in Chapter 2 on Wellness and elsewhere in this text.

1.1.3 What's New in the Second Edition?

As with any subject, the understanding of infectious disease management has evolved in the decade since the publication of the first edition. Ongoing research has refined the profession's knowledge of complex and emerging diseases such as feline leukemia and canine influenza, leading to updated recommendations for diagnostic testing and management in shelter animals. Practical field experience has also honed understanding of the best ways to manage long-standing problems. For instance, at the time of publication of the first text, the use of antibody titers and RT-PCR (reverse transcription- polymerase chain reaction) testing for the management of canine distemper outbreaks was relatively new. These methods have now been proven effective in managing many shelter outbreaks, leading to expanded opportunities for non-lethal responses to this potentially devastating illness.

Alongside these advances in understanding disease management, new products have also led to expanded opportunities to preserve shelter animal health. For instance, accelerated hydrogen peroxide (Rescue™) has become a widely used disinfectant in shelters over the last 10 years. This product's reliability against viruses, safety, rapid action, multiple uses and relatively good penetration into organic matter have allowed more efficient sanitation

strategies as well as more flexible use of housing materials. Another example is the development of "portals" to conjoin two cages into one more spacious double-compartment unit, allowing segregation of eating and resting areas from those used for elimination. The reduced handling and disease transmission associated with double-compartment housing, along with reduced stress, have led to reported reductions in feline upper respiratory infections (URI) of 70% or more at some shelters (CFHS 2018; Karsten et al. 2017).

The second example above highlights the impact of a growing body of shelter-specific research that extends well beyond the traditional arsenal of infectious disease management tools. The development of the portal was based on the finding that the risk for feline URI was dramatically lessened by the provision of >8 ft² floor space in cage housing during the first week of care (Wagner et al. 2018). Another study documented improved immunity and decreased feline URI risk associated with consistent, gentle human interaction with cats (Gourkow and Phillips 2015). The importance of such non-traditional approaches to disease management is reflected in Chapter 2 on Wellness and elsewhere throughout this text.

1.2 The Growth of Shelter Medicine

While scientific advances have been significant, one of the most dramatic developments regarding disease control in shelters has been the rapid evolution of the field of shelter medicine itself. The original edition of this book was published within a decade of such milestones as the first formal course in shelter medicine (taught at Cornell University in 1999), the establishment of the first Shelter Medicine residency training program at UC Davis in 2001, and the founding of the Association of Shelter Veterinarians (ASV) in that same year. Many veterinary colleges have

since incorporated shelter medicine classes and shelter externship opportunities into their core and elective curricula.

In the decade since then, the rapid expansion of shelter medicine has been a striking development within veterinary medicine as well as within the field of animal sheltering. From a disease control perspective, a major milestone was reached with the publication of the ASV Guidelines for Standards of Care in Animal Shelters in 2010. This document addressed everything from shelter management, policy and record-keeping; through population management, facility design and sanitation; to the maintenance of physical and behavioral health of animals. The guidelines provide a powerful foundation for any program to maintain shelter animal health because all these elements are interrelated.

In addition to the ASV shelter guidelines, there has been an explosion of resources regarding virtually every aspect of shelter animal care and management. Along with a second edition of the seminal textbook “Shelter Medicine for Veterinarians and Staff,” veterinary guidelines and/or textbooks now exist addressing data collection and interpretation in shelters; animal behavior for shelter veterinarians and staff, forensic medicine; high quality, high volume spay/neuter, and more. Websites maintained by shelter medicine programs at various veterinary colleges (e.g. UC Davis, Cornell, the University of Florida, University of Wisconsin) and organizations such as the American Society for the Prevention of Cruelty to Animals (ASPCA) and Maddies’ Fund are just a few of the resources that provide useful and practical information for shelter medicine professionals.

The development of shelter medicine as a veterinary specialty has accompanied this proliferation of resources and research. The American Board of Veterinary Specialties conferred provisional recognition of shelter medicine as a specialty within the American Board of Veterinary Practitioners (ABVP) in 2014, and the first diplomates were certified the following year. As more veterinarians seek and

attain board certification in shelter medicine, the pool of research and expert consultants to support successful disease-control programs in shelters will continue to grow.

1.2.1 Continued Advances in Animal Shelter Management

Advances in shelter medicine over the last decade have paralleled and supported the rapid evolution of animal-shelter management and community policy concerning abused, homeless and free-roaming dogs and cats. These changes, in turn, have resulted in substantially improved outcomes for shelter animals in many regions. A national database, Shelter Animals Count, (www.shelteranimalscount.org) has been developed to document these trends within the United States. Improvements to cat outcomes have been particularly striking. In 2018, the Million Cat Challenge (www.millioncatchallenge.org) announced that over 1,300 member shelters increased life-saving success compared to each shelter’s baseline by over 1.1 million cats in the four years from 2014 to 2018.

With improved outcomes, a positive cycle has been created that further supports successful programs to control disease. Though the belief that euthanasia should be reserved for dangerous or suffering animals is a widely shared value, historically, the number of live outcomes has failed to keep pace with the rate at which healthy animals were admitted to many shelters. This created a painful dilemma: either euthanize healthy animals to create space or permit crowding and allow the resultant disease to take its toll. Non-lethal methods to balance shelter intakes with live outcomes are therefore a potent tool to maintain shelter animal health and welfare.

The practice of “Return to Field” (RTF) (also sometimes called Shelter/Neuter/Return), widely implemented in US shelters over the last decade, provides an example of this phenomenon. (Spehar and Wolf 2019). These programs involve sterilizing, vaccinating and

returning cats to the location of origin, and are differentiated from traditional Trap/Neuter/Return (TNR) programs in that they target cats admitted to the shelter as part of normal animal control services, versus specifically captured with the intent to have the cat sterilized. Analysis of one of the first large-scale RTF programs demonstrated not only a reduction in euthanasia of over 75%, but also a 99% decrease in the number of cats euthanized for URI. With an additional outlet for healthy cats other than adoption, shelter managers are far less likely to face a choice between crowding or euthanasia – and the impact on feline health can be dramatic.

1.3 Capacity for Care: Blending Shelter Medicine and Management

The foregoing examples demonstrate the synergy that occurs when shelter health and shelter management practices work in support of each other. The most effective infectious disease control program will address the overall functioning of the shelter as a system, balancing animal intake with the organization's ability to provide appropriate care and find suitable outcomes. The success of this approach has been demonstrated in a shelter management model known as "Capacity for Care," which has been linked to decreased disease and euthanasia and increased live release rates (Karsten et al. 2017). Though piloted with an emphasis on cats, this model applies equally to dogs and involves optimizing the number of animals housed at any one time; actively managing the LOS of animals in the shelter; providing housing for each animal that meets or exceeds the ASV Guidelines for Standards of Care in Animal Shelters and using methods such as scheduled admission and removing barriers to adoption to maintain the population within the organization's humane capacity without resorting to increased euthanasia (CFHS 2016).

Whether used under the formal umbrella of the Capacity for Care management model or otherwise, these practices, when combined, represent an integrated approach that powerfully supports animal health and limits environmental disease transmission. Under these conditions, it is realistic to expect the spread of serious infectious disease to be a relatively rare event. The shelter practitioner can then turn their attention to the chapters within this text that focus on methods to treat animals that enter the shelter already infected, or to improve the health of animals in the community.

Conversely, when housing is poor, LOS prolonged, or animal care is otherwise compromised because shelter capacity is exceeded, even the best vaccination, segregation and sanitation practices will be insufficient. In the face of repeated outbreaks or high levels of endemic disease, the reader is encouraged to revisit this chapter and access other resources – including the numerous guidelines, texts, and consulting services now available – to bring the shelter population into greater balance with the organization's ability to provide care.

1.3.1 Right-Sizing the Population

The ASV Guidelines for Standards of Care caution that "Every sheltering organization has a maximum capacity for care, and the population in their care must not exceed that level" (Newbury et al. 2010). The "right-size" for the shelter population at any one time can be defined as that which maximizes the number of animals served while not exceeding the organization's capacity to provide humane care. Limits on capacity include the number of adequately sized housing units, staffing level, and availability of specialized medical and behavioral care where needed.

Some of these numbers are relatively straightforward to determine. For example, in order to generate an estimated maximum population that can be accommodated, housing units can simply be counted, while total staff time available for daily animal care can be

divided by the amount of time required for care on a per animal basis. The National Animal Care and Control Association (NACA) and Humane Society of the United States suggests a minimum of 15 minutes per animal per day for cleaning and feeding as a general guideline (NACA 2009). However, as expectations for care increase and shelter admissions shift toward animals requiring more medical and behavioral care, the time required per animal is better calculated based on direct observation and documentation of average care needs.

Even when housing numbers and staff time are ample, it may still be advantageous to maintain the population below the maximum that can be physically accommodated (Swanson 2015). Rather, the ideal size of the population is driven by the average daily expected throughput (intake or outcome) of animals multiplied by the target LOS to the best possible outcome. The “average daily throughput” should generally be based on monthly intake and outcome estimates based on past performance and, ideally, should be calculated separately by species and age of animals (juvenile versus adult).

Though calculations should ultimately be made separately for holding areas and other common pathways such as animals awaiting transfer to partner agencies, the ideal number of animals available for adoption provides a straightforward illustration and can be a good place to start. This number has sometimes been described as “Adoption Driven Capacity.” For instance, if a shelter expects to perform 60 adult cat adoptions in one month, based on historical trends and aims to keep the LOS for cats at no more than 15 days, the calculation for the ideal number of cats awaiting adoption is as follows:

Sixty cats adopted per month/30 days in a month = ~two cats adopted on average each day. Two cats adopted each day × 15 days target LOS per cat to adoption = 30 cats on average that should be available for adoption at any given time.

Doubling the number of cats available from 30 to 60 would mean that cats stay twice as long on average unless the increased population somehow bring in twice the number of adopters.

Conversely, reducing the number of cats awaiting adoption from 30 to 20 (for instance via a one-time adoption promotion event) would lower the average LOS from 15 days to 10 (20 cats available for adoption/two adoptions on average per day). The benefits this population decrease could have, in terms of staff time and resource allocation, as well as the direct health effects of reduced population density and shorter LOS, will be apparent to the reader.

This example is provided only as a brief illustration. Detailed instructions on “right-sizing” shelter populations are beyond the scope of this chapter but can be found elsewhere, often under the heading “Capacity for Care” (CFHS 2018; Karsten et al. 2017). Suffice to say that performing these calculations and developing strategies to right-size the shelter population and maintain it at that level are a vital component of a successful shelter health and infectious disease control program.

1.3.2 Length of Stay (LOS)

Reducing the LOS in shelters is an end in itself, provided that it does not come at the expense of successful life-saving outcomes. From a welfare perspective, even the best shelter housing does not replicate the experience of being in a home. Meeting an animal’s behavioral needs becomes more challenging the longer they remain in confinement. Studies have also documented an increased risk of shelter-acquired disease as LOS increases (Dinnage et al. 2009; Edinboro et al. 2004). Behavioral deterioration and illness in turn can lead to yet longer stays, triggering a negative cycle that can be difficult to reverse. To avoid this, pro-active plans and consistent checkpoints should be in place, and LOS should be reported and evaluated on a regular basis as a vital indicator of shelter animal and system health.

1.3.2.1 Pathway Planning and Daily Rounds

In addition to right-sizing the population as described above, methods to reduce the LOS

include active “pathway planning” toward the best possible outcome for each animal from the moment of admission (or even more ideally, before the animal is admitted), and performing daily population rounds to keep each animal on track. The daily rounds team should include staff members able to assess and resolve clerical-/client-service issues (such as administrative paperwork and client-contact concerns) as well as animal care, medical and behavioral issues. The daily assessment should include an evaluation of the following:

- Paperwork/computer record (including any signage on the animal’s housing unit)
- Animal location within the facility and with regard to availability status (e.g. moving animals to adoption at the end of required holding periods)
- Animal health and demeanor, taking steps as needed to address medical and behavioral concerns, reduce stress and improve comfort (e.g. moving a stressed dog to a quieter ward)
- Actions required to move the animal toward the best possible outcome, such as scheduling surgery, contacting rescue, promoting adoption, etc.

The daily rounds team is not expected to both identify and accomplish all needed actions. Rather, daily rounds are a time to capture and assign tasks to the appropriate staff members. While it may seem daunting at first, rounds will more than repay the time it requires to complete them by identifying and removing bottlenecks to animal flow, resolving issues before they cause delays, and noticing and addressing animals’ needs to prevent, or at least mitigate, health and behavioral risks. Ultimately, daily rounds save substantial staff time and reduce costs overall.

1.3.2.2 Fast Track Management and Open Selection

A common concern around reducing LOS is that animals will not have time to find their perfect match, especially those with more extensive needs or that are simply a little less

likely to appeal to the average adopter. It’s important to remember that arbitrary time limits are not a method to reduce the LOS, nor is rushing to euthanasia ever a solution unless an animal is irremediably suffering. Fortunately, such measures are not needed: programs to reduce LOS are designed to benefit *all* animals passing through the shelter, regardless of their perceived adoptability.

One way to ensure sufficient resources for those animals that require more of an investment is to capitalize fully on the potential of some animals to move through the shelter system very quickly. Fast Track management and Open Selection are two well-described methods to accomplish this. The purpose of introducing them here is to familiarize the reader with the concepts and terminology should they wish to pursue more information, which is widely available in publications and web-based sheltering resources.

1.3.2.2.1 Fast Track Management

Fast Track management involves identifying those animals that, as noted above, have the potential to move rapidly through the shelter to adoption. While each shelter should identify what makes an animal “fast track” based on their own records and experience, for most shelters, this will include puppies, kittens, and friendly, healthy, non-geriatric animals, especially those with an unusual breed/appearance, a compelling story, or physical features such as one eye or extra toes that make them appear to be most adoptable.

At its most basic, Fast Track management simply means that these animals “skip to the head of the line” to be processed first. In other words, rather than processing animals in order of intake date, the most adoptable animals get the first spot available in surgery or on the adoption floor. While this may initially seem unfair, Fast Track management tends to benefit “slow track” animals equally, if not more. By moving the fast trackers through quickly, population density is reduced, leaving more space and time to care for, enrich and promote

the slow trackers; all of which also helps them move through the shelter more quickly. In fact, some shelters have reported greater decreases in LOS for slow trackers than for fast trackers following a shift to this management method. Additional resources on this subject can be found in the textbook “Shelter Medicine for Veterinarians and Staff” and by searching online for the term Fast Track management in animal shelters (Newbury and Hurley 2012). At the time of publication, two excellent resources on this subject could be found at (<https://www.animalsheltering.org/magazine/articles/life-fast-lane>) and <https://www.sheltermedicine.com/library/resources/?r=fast-track-slow-track-flow-through-planning>.

1.3.2.2.2 Open Selection

Open Selection simply refers to the practice of allowing potential adopters to view, interact with and select animals during their holding period. It is appropriate for any potentially adoptable animal, without valid identification or other indicators, that they are likely to be reclaimed. By allowing Open Selection, the legal hold on a stray animal can serve the double purpose of allowing animals to be considered for adoption at the same time as awaiting possible reclaim, with the benefit that the potential adopters themselves will then indicate which animals are truly “Fast Track.” By definition, any animal selected for adoption during its hold period has the potential to move quickly through the system and should be prioritized for surgery or any required procedures as soon as they can legally be performed.

Logistically speaking, depending on the housing setup, Open Selection animals can be directly housed in adoption areas with signage indicating that they are not yet available, or visitors can be allowed into stray holding areas. Either way, a simple system should be developed to document holds and determine priority, if more than one potential adopter is interested. Open Selection alone can have a surprisingly big impact on lowering the LOS

and reducing population density, sometimes opening the door for more resource-intensive interventions such as daily rounds or housing improvements. This is especially true where a long stray hold inevitably prolongs LOS or when lack of room in adoptions or lack of staff for needed procedures (such as testing or surgery) leaves animals to languish in the shelter past their date of availability.

1.3.2.3 Other Methods to Reduce the Length of Stay

In addition to the methods outlined above, shelter managers and veterinarians should work together with policymakers and other stakeholders, as needed, to reduce unproductive LOS at every opportunity. This is by no means an exhaustive list, but some methods may include:

- Reduce or eliminate stray-holding periods, especially for animals unlikely to be reclaimed
 - In most shelters, reclaim – or at least initial contact with an owner – tends to occur within the first few days of impound. Holding periods beyond this tend to delay progress along other life-saving pathways.
- Eliminate voluntary intake quarantine periods for healthy appearing animals (as described earlier in this chapter).
 - This includes eliminating holds for puppies and kittens awaiting second vaccines. The best protection for young animals is to practice excellent biosecurity when handling and housing in a shelter, and to move them out into homes (permanent or foster) as quickly as possible.
 - Intake quarantine may still be indicated for animals with an extraordinarily high risk of serious disease, such as transfers from a shelter experiencing an active parvovirus or distemper outbreak or victims of animal hoarding.
- Eliminate bottlenecks associated with procedures that can only be performed by specialized staff, especially those that are difficult

to interpret or provide limited additional information to adopters.

- Consider allowing feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) testing to be performed by the adopter's veterinarian with the opportunity for more in-depth conversation and follow-up about the implications and uncertainties of test interpretation and prognosis in a healthy cat.
- Consider replacing formal behavior evaluations in dogs with a holistic assessment of the dog's history and behavior throughout the shelter stay. Some shelter medicine and behavior experts have raised questions about the validity of non-peer-reviewed behavior evaluations of shelter animals for adoption (Patronek and Bradley 2016).
- Perform spay/neuter surgery on healthy, robust kittens at 1.5 pounds rather than waiting until they reach 2 pounds.
 - Though 2 pounds/1 kg have been common cut-offs for surgical weight in kittens, there is no scientific basis for this tradition and 1.5 pounds is considered acceptable from both a surgical and developmental perspective (ASV 2016).
 - The same surgical, anesthetic, before- and after-care precautions should be used as for pediatric spay/neuter in 2-pound kittens.
 - This can be especially helpful in reducing LOS when foster options are limited and kittens must spend time in the shelter awaiting either a foster home or surgery.

1.3.3 The Importance of Good Housing

For both dogs and cats, shelter housing plays a pivotal role in determining disease risks and spread. The quality and setup of the housing unit will impact every aspect of the animal's experience, from how well they eat and sleep to the quality of the air they breathe. In turn, these factors will in large

part determine the animal's susceptibility to disease. Something as simple as separate areas for feeding/resting versus elimination can have a profound effect on animal health and well-being.

The elements of adequate housing to support shelter animal health are described in more detail in Chapter 2 on Wellness, as well as in the ASV Guidelines for Standards of Care in Animal Shelters and other resources. For instance, a comprehensive description of cat-housing considerations in shelters was recently published at the time of this writing. As shelter housing best practices evolve, they should be given priority and attended to meticulously. Though animal health can be preserved even in a dilapidated facility, if the housing units themselves impede an animal's ability to exhibit normal behaviors, are cramped or poorly ventilated and exacerbate noise or stress, infectious disease control will be an ongoing struggle.

1.3.4 Balancing Intake and Positive Outcomes

Right-sizing the population, actively managing LOS and providing high-quality housing will go a long way toward maintaining a shelter population within the organization's capacity to provide care. However, there may still be times when the incoming population exceeds the organization's ability to provide appropriate outcomes. While even the most successful shelter health program may not be sufficient to fully remedy such an imbalance – especially when substantial funding or policy barriers to life-saving programs exist – interventions other than euthanasia are more likely to be effective and accepted, as well as being an end in themselves.

Fortunately, it is increasingly recognized that methods to regulate intake and increase live outcomes are appropriate for shelters of all types, whether publicly funded/municipal or private/non-profit and regardless of the terminology by which they are described (e.g. "Open

admission,” “Adoption guarantee” or “No-kill”). For instance, at the time of publication of the first edition of this text, scheduling intake, in coordination with available space, was a relatively uncommon practice at municipal shelters. However, it is now more widely recognized that this represents a responsible policy and indeed a best practice to better serve both animals and the public.

This does not mean that intake is limited, only that it is coordinated with available space in order to maintain safe and humane conditions in the shelter. For instance, the intake of an animal presented on a Friday might be deferred until after an adoption event over the weekend in order to make space without resorting to euthanasia. In fact, just as public health is often best served by preventive programs designed to keep people *out* of hospitals, more shelters and communities are investing in safety net programs that serve many animals without requiring shelter entry at all (HSUS 2012).

On the other side of the equation, more strategies have been developed to increase live outcomes for those animals that do enter the shelter’s care. For instance, high fees and restrictive policies were once widely considered imperative to protect animals from ill-prepared or uncaring adopters. However, it is now known that animals adopted through a conversational rather than a strict, policy-based adoption process, acquired without a fee and even received as gifts receive equal levels of care and enjoy equal levels of owner attachment (Weiss and Gramman 2009; Weiss et al. 2014). The negative consequences of high adoption fees should never be underestimated: the resultant increases in LOS, crowding and subsequent illness and even euthanasia far outweigh any adoption revenue that would have been gained. Fee-waived events, adoption promotions and a welcoming adoption process are as integral to maintaining animal health in shelters as any medical treatment or vaccine.

Finally, as described earlier in this chapter in the case of RTF, shelter animal health as well as outcomes can be dramatically improved when adoption is not the only live pathway out. Transport programs provide an interim solution to move animals from higher to lower risk shelters, and detailed guidelines and regulations have been developed to minimize the risk associated with this practice by various states, the ASV and National Federation of Humane Societies, among others (National Federation 2019; Newbury et al. 2010). Ideally, in the longer term, shelters and communities will continue to explore and expand other avenues for increasing live outcomes. In addition to RTF, this includes increasing the number of animals reunited with their owners through non-punitive approaches mirroring the “adopters welcome” approach that has enjoyed such success by not only encouraging members of the community to adopt shelter animals, but by also offering ongoing support (<http://www.animalsheltering.org/topics/adoptions>).

1.4 Conclusion

When the first edition of this book was published in 2009, the urgency of bringing a systematic and tailored approach to infectious disease control in shelters was clearly evident. The focus in the first text was on the management of individual diseases and included chapters on vector-borne, dermatologic and gastrointestinal (GI) diseases. Those chapters have been eliminated in this edition because the information is available elsewhere and has not changed substantially. As shelter medicine and the profession of animal sheltering continue to evolve, the rewards of population-oriented strategies have become ever-more apparent and thus have received more attention in this second edition. By combining the traditional methods of veterinary science with a growing understanding of the unique needs

and opportunities in this complex field, the holistic vision of the shelter practitioner as an essential cog in the “Production Medicine” model – where the “product” is healthier

animals, shelters and communities, with more animals leaving shelters alive and fewer needing to enter the shelter at all, is closer to being realized.

References

- ASV (Association of Shelter Veterinarians) (2016). The Association of Shelter Veterinarians’ 2016 Veterinary Medical Care Guidelines for Spay-Neuter Programs. *Journal of the American Veterinary Medical Association* 249 (2): 165–188.
- CFHS (Canadian Federation of Humane Societies) (2018). Capacity for Care Case Studies Update. In: Capacity for Care Case Studies, 1–26. Canadian Federation of Humane Societies.
- Dinnage, J., Scarlett, J.M., and Richards, J.R. (2009). Descriptive epidemiology of feline upper respiratory tract disease in an animal shelter. *Journal of Feline Medicine and Surgery* 11: 816–825.
- Edinboro, C.H., Ward, M.P., and Glickman, L.T. (2004). A placebo- controlled trial of two intranasal vaccines to prevent tracheobronchitis (kennel cough) in dogs entering a humane shelter. *Preventive Veterinary Medicine* 62: 89–99.
- Gourkow, N. and Phillips, C.J. (2015). Effect of interactions with humans on behaviour, mucosal immunity and upper respiratory disease of shelter cats rated as contented on arrival. *Preventive Veterinary Medicine* 121 (3–4): 288–296.
- HSUS (Humane Society of the United States) (2012). Pets for Life survey.
- Karsten, C.L., Wagner, D.C., Kass, P.H. et al. (2017). An observational study of the relationship between capacity for care as an animal shelter management model and cat health, adoption and death in three animal shelters. *The Veterinary Journal* 227: 15–22.
- Lechner, E.S., Crawford, P.C., Levy, J.K. et al. (2010). Prevalence of protective antibody titers for canine distemper virus and canine parvovirus in dogs entering a Florida animal shelter. *Journal of the American Veterinary Medical Association* 236 (12): 1317–1321.
- National Animal Care and Control Association (NACA) (2009). Determining Kennel Staffing Needs. <http://www.nacanet.org/kennelstaffing.html> (accessed 17 July 2019).
- National Federation of Humane Societies (2019). Companion Animal Transport Programs – Best Practices Overview. <http://www.humanefederation.org/TransferBestPractice.cfm> (accessed 17 July 2019).
- Newbury, S. and Hurley, K. (2012). Population Management. In: Shelter Medicine for Veterinarians and Staff (eds. L. Miller and S. Zawistowski), 93–114. Ames: Blackwell Publishing.
- Newbury, S., Blinn, M.K., Bushby, P.A. et al. (2010). ASV Guidelines for Standards of Care in Animal Shelters. <https://www.sheltervet.org/assets/docs/shelter-standards-pdf> (accessed 17 July 2019).
- Newbury, S., Moriello, K.A., Kwochka, K.W. et al. (2011). Use of itraconazole and either lime sulphur or Malaseb Concentrate Rinse® to treat shelter cats naturally infected with *microsporum canis*: an open field trial. *Veterinary Dermatology* 22 (1): 75–79.
- Patronek, G.P. and Bradley, J. (2016). No better than flipping a coin: reconsidering canine behavior evaluations in animal shelters. *Journal of Veterinary Behavior* 15: 66–77.
- Spehar, D.D. and Wolf, P.J. (2019). Integrated return-to-field and targeted trap-neuter-vaccinate-return programs result in reductions of feline intake and euthanasia at six

- municipal animal shelters. *Frontiers in Veterinary Science* 6: 1–13.
- Swanson, D. (2015). What’s your magic number? Analyzing shelter capacity can increase live releases. *Animal Sheltering* (May/June), pp. 20–24.
- Wagner, D.C., Kass, P.H., and Hurley, K.F. (2018). Cage size, movement in and out of housing during daily care, and other environmental and population health risk factors for feline upper respiratory disease in nine North American animal shelters. *PLoS One* 13 (1): e0190140.
- Weiss, E. and Gramman, S. (2009). A comparison of attachment levels of adopters of cats: fee-based adoptions versus free adoptions. *Journal of Applied Animal Welfare Science* 12 (4): 360–370.
- Weiss, E., Gramann, S., Dolan, E.D. et al. (2014). Do policy based adoptions increase the care a pet receives? An exploration of a shift to conversation based adoptions at one shelter. *Open Journal of Animal Sciences* 04 (05): 313–322.