

Public health risks in animal shelters

by

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Abstract

Animal shelters play a critical role in society and their utility need not be argued. Sheltering community animals serves many purposes, of which many relate to public health. Keeping free-roaming animals off the roads, minimizing human encounters with dangerous animals, and providing people with healthy, adoptable animal companions are amongst a few of the ways animal shelters contribute to improving public health. However, animal shelters also present inherent risks to those who visit the shelter. Infectious diseases are of particular concern in animal shelters because group housing creates an environment of increased exposure, susceptibility, and transmission of disease (Pesavento & Murphy, 2014). Of the infectious diseases animal shelters commonly see, many are zoonotic and place people in contact with these animals at risk of disease. Other public health risks at animal shelters include animal-related injuries and personal safety. Animal shelters should consider these risks when managing their daily operations to maximize both animal and human health.

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List of Abbreviations

PPE = personal protective equipment

URI = upper respiratory infection

DTM = dermatophyte test media

MRSA = methicillin-resistant *Staphylococcus aureus*

CDPH = California Department of Public Health

Chapter 1 - Learning Objectives

1. To understand the role a shelter veterinarian plays in protecting public health
2. To go through the entire process of a public health consult of an animal shelter
3. To recognize public health hazards in a shelter setting and to work with shelter staff to reduce risk
4. To learn the most effective way to make recommendations for improvement
5. To specifically investigate the public health implications of ringworm in a shelter setting and make recommendations for minimizing risk of human and animal infection

Chapter 2 - Overview of Methods

The author's focus of this field experience was to gain an understanding of the public health aspects of animal shelters and the role shelter veterinarians play in protecting public safety. Public health assessments were completed for two shelters in Southern California: Shelter A and Shelter B. The author did on-site evaluations of each shelter and evaluated each shelter in several public health related areas including staff and volunteer safety, animal-related injury protocols, and zoonoses risk assessment. Strengths and weaknesses were summarized and shared with the shelter management. These public health assessments followed the Association of Shelter Veterinarians Guidelines for Standards of Care in Animal Shelters. Additionally, the author was involved with a ringworm outbreak at Shelter A. Involvement included:

1. Identifying ringworm positive animals
2. Risk assessment of all animals at shelter
3. Containing the outbreak
4. Treating affected animals
5. Educating the public
6. Training staff
7. Making new protocols to reduce impact of future ringworm outbreaks

The author used information gathered from the public health assessments to create written protocols for the shelters to better improve the public health components of the shelters. The field experience was guided by Zarah Hedge, DVM, MPH, Dipl. ACVPM, Dipl. ABVP who consults with local animal shelters. Dr. Hedge completed a three-year shelter medicine residency program at the Oregon Humane Society in 2013.

Chapter 3 - Ringworm

Literature Review

Animal shelters have the potential to create the perfect storm of infectious disease: susceptible hosts, increased exposure to disease agents, and environmental factors that favor disease transmission. Shelters house a transient population of animals that lack medical histories, many of which come from roaming and scavenging backgrounds. These animals often have host factors that leave them particularly vulnerable to disease including incomplete or inadequate vaccination status, parasitic infestation, stress, and poor nutrition, all of which can compromise the immune system (Hurley, 2005). Additionally, shelters can present environmental risks for development of disease such as poor ventilation and sanitation, cramped housing units, and close contact with other animals. Intensive housing environments provide animals and conditions that can enable emergence of novel pathogens or pathogens with altered virulence. Animal shelters have been the origin of several emerging fatal infectious diseases over the past decade including systemic streptococcal infections and hemorrhagic respiratory *Escherichia coli* (Pesavento & Murphy, 2013). While these newly emerging pathogens present potential threats to animal and human health, common and yet often overlooked zoonotic pathogens such as ringworm, remain problematic as well. The public health risks of zoonotic disease transmission from animal shelters is poorly documented despite evidence to suggest the risks exist. Shelter workers interact with rapidly changing populations of animals and are more likely to encounter zoonotic diseases than non-shelter workers (Miller, 2013). Animal shelters may also serve as a source of disease exposure to the general public, as shelters often allow the public to interact with animals, and diseases can sometimes exist in asymptomatic animals. Animal shelters should take extra precautions to reduce the risk of zoonotic disease transmission by following good public health practices. Knowledge of zoonotic diseases and good infection control practices can reduce the risk of infection in both human and animal populations. This review will consider the public health risk of zoonotic diseases in an animal shelter setting, with a special focus on ringworm species.

Infectious diseases in animal shelters are transmitted via fomites, direct and indirect transmission, airborne, and vectors (Miller, 2013). Method of transmission is an important factor to assess because it can direct preventative efforts. In general, the information documenting the

incidence of zoonotic disease transmission among veterinary workers is limited, likely because many common zoonotic diseases are not reportable and are self-limiting or easily treated; however some data do exist. In a survey of veterinarians in Oregon, researchers found that across all areas of practice, nearly half of the survey respondents reported having had a zoonotic infection, of which 57% of those occurred via contact transmission, particularly ringworm (Jackson & Villarroel 2011). In a 2005 survey conducted by the CDC in collaboration with the AVMA, researchers found that 71% of small animal veterinarians surveyed were most concerned about risks associated with ringworm, and yet of those veterinarians, only 20% wore appropriate PPE during examination of an animal with dermatologic signs (Wright et al, 2008). A cross-sectional needs-assessment survey of animal shelters in a 6-state region in the western US revealed that ringworm is among the top-three diseases of concern to shelters. The survey highlighted a serious need for infectious and zoonotic disease training for staff and volunteers. Of the shelters surveyed, only 30% of staff and 35% of volunteers receive infectious disease training upon hire. Those numbers only increased to 57% and 36%, respectively, when a problem arose (Steneroden, Hill, & Salman 2011). If staff and volunteers are not properly trained or educated about infectious and zoonotic disease, the risk of transmission and propagation of disease is likely to be increased. Additionally, this lack of training leaves the public at greater risk that contact between the public and pets will lead to zoonotic disease transmission because zoonotic diseases, such as ringworm, are more likely to go undetected in shelter animals for longer periods of time.

As with shelter animals, shelter workers have increased risks of zoonotic disease. Host susceptibility, exposure to disease agents, and environmental risks are all amplified for shelter workers. Shelter workers often face more stress than other professions due to what Reeve and Rogelberg named euthanasia-related strain. In a 2005 study, they obtained a quantitative index of the prevalence of euthanasia-related strain among animal-shelter employees. They found that a significant number of workers directly involved in euthanasia perceived euthanasia to be a work stressor that negatively impacted their well-being. Perceptions of euthanasia-related strain were also associated with somatic complaints and substance abuse (Reeve, Rogelberg, Spitzmuller, & Digiacomio, 2005). The psychological, physical, and emotional burdens shelter workers face daily have been suggested causes of health ailments including high blood pressure, ulcers, depression, and suicide (Rogelberg et al 2007). These physical and mental stressors can impact

shelter workers' immune systems, which further puts them at risk of contracting a zoonotic disease.

In addition to the risk zoonotic diseases present to shelter workers, the public is potentially at risk if an outbreak is not contained appropriately or promptly. Many shelters allow visitors and volunteers to handle the animals, often with little to no supervision from staff. If an animal has not yet been identified as being disease-positive, someone could handle that animal and unknowingly become infected. If that same person then goes on to touch another animal in the shelter, the disease can be spread very quickly. To the author's knowledge, no studies have been done evaluating the incidence of zoonotic disease transmission from shelter animals to shelter visitors. One explanation for this lack of data is that staff, volunteers, and the general public are often not educated to detect disease and may not consider the risks before handling a cat or dog that looks unwell or may not correlate their own infection with an animal they handled or interacted with at the shelter.

Public health risk of zoonotic diseases is greatly magnified by the general lack of zoonotic disease knowledge amongst animal shelter workers. The longer a disease goes unidentified in a shelter population, the longer the public is at risk of encountering a diseased animal. In a 2010 survey, Steneroden, Hill and Salman reported that 88% of shelters would benefit from zoonotic disease training. In a follow up study, baseline data of shelter workers' zoonotic disease awareness were gathered and then tested again after implementation of a zoonotic disease awareness training program. The study assessed knowledge of common zoonotic diseases seen in shelters including plague, rabies, leptospirosis, internal parasites, MRSA, and salmonella. The baseline data revealed a general lack of zoonotic disease awareness with many participants commenting that they had never even heard of common diseases let alone knew how to recognize them. The study found significant improvement in test scores assessing basic knowledge of common zoonotic diseases in shelters following participation in a 3-hour training program. This study highlighted an educational gap in our shelter systems that should be addressed to improve public health practices. Zoonotic disease awareness training for shelter workers could potentially improve early disease detection, proper personal protective equipment use, hand hygiene, and cleaning and disinfecting efficacy (Steneroden, Hill, & Salman 2010).

Given the transient employment of many animal shelter staff, infection control protocols can help to provide consistency and direction when dealing with an infectious disease outbreak.

Only 13% of shelters reported having an infection-control manual (Steneroden, Hill, & Salman 2010). This low percentage is perhaps to blame for low numbers of educated staff and volunteers. While many shelters likely have unwritten procedures for controlling disease outbreaks, having written protocols is a useful tool to educate new staff and volunteers. Written infection manuals create a standard for employees and volunteers to abide by. Without such standard, it is difficult to provide consistent expectations for handling a disease outbreak. High turnover of staff and volunteers at shelters makes it difficult to keep everyone up-to-date on shelter protocols. A standardized training program should be in place for staff and volunteers to improve awareness on zoonotic disease transmission, infection control, and perhaps most importantly, personal protective measures people need to take.

Ringworm presents some unique challenges to animal shelters and the public health. While human ringworm infestation is generally a self-limiting, non-fatal disease, it has been reported to be one of the most commonly transmitted zoonotic disease in the veterinary field and is therefore a public health concern (Jackson, 2010). Ringworm is of particular risk to public health because it is often difficult to detect, it is easily transmitted via fomites, and it requires careful and thorough decontamination (Chermette, Ferreiro, & Guillot 2008). Dermatophytosis (ringworm) is caused by a fungal infection with dermatophytes. Ringworm infection can be caused by *Microsporum canis*, *Microsporum gypseum*, or *Trichophyton mentagrophytes*; however 95% of all feline ringworm cases are caused by *Microsporum canis* (Greene, 2012). Upon contact with skin, spores develop in tissue and clinical signs develop as the fungus produces damaging elastase, collagenase, and keratinase. Clinical signs can also develop due to an allergic response to the fungi. Ringworm is characterized by circular, inflamed lesions with hair loss and crusty skin. Lesions are most commonly found on the face, ears, feet, and tail. The incubation period is between 4 days and 4 weeks which is problematic with the nearly constant influx of new animals into shelters. It is not routinely recommended to quarantine animals that enter the shelter as apparently healthy due to the high risk of shelter-acquired infections; however a physical exam and woods lamp screening on intake can be useful in detecting ringworm-positive animals. The infection eventually resolves via cell-mediated immunity over a period of weeks to months; however some animals become carriers that remain chronically infected, which is also problematic in group housing situations. Geriatric cats, cats younger than 1-year, immunosuppressed cats (such as pregnant or lactating cats or those infected with feline

immunodeficiency virus or feline leukemia virus), or stressed cats are more likely to be severely affected by ringworm infection. Unfortunately, cats in animal shelters often exhibit one or more of these characteristics, predisposing them to more severe ringworm infections. Clinical signs in humans are essentially the same as in animals. Lesions are often much easier to see due to lack of fur, and are sometimes reported as being pruritic (Greene, 2012).

Case Report: Outbreak investigation and management of dermatophytosis in felines at a traditional animal shelter in Southern California

Introduction and Background

Shelter A is a unique operation that encompasses the collaborative effort of the non-profit 501(c)(3) and the city's animal control officers. Budget cuts reduced the shelter's operating budget by approximately 40% and in 2016 the non-profit organization took over the main operations of the shelter. This organization relies mostly on private funding to run the shelter. During the time of the budget cuts, the shelter manager left the position, leaving the shelter without a manager during the late spring of 2016. A new manager started in July. A separate non-profit organization uses the surgery suite on Saturdays for spays and neuters and medical care for the public. Additionally, the shelter works with other rescue groups and adopts out animals through adoption events at a local Petco. This conglomeration of organizations operating the shelter has created some management challenges. Shared responsibilities between organizations, as well as management turnover, creates potential communication gaps, as witnessed by a ringworm outbreak in the summer of 2016. At the time of the outbreak, no written protocols were in place regarding infection control.

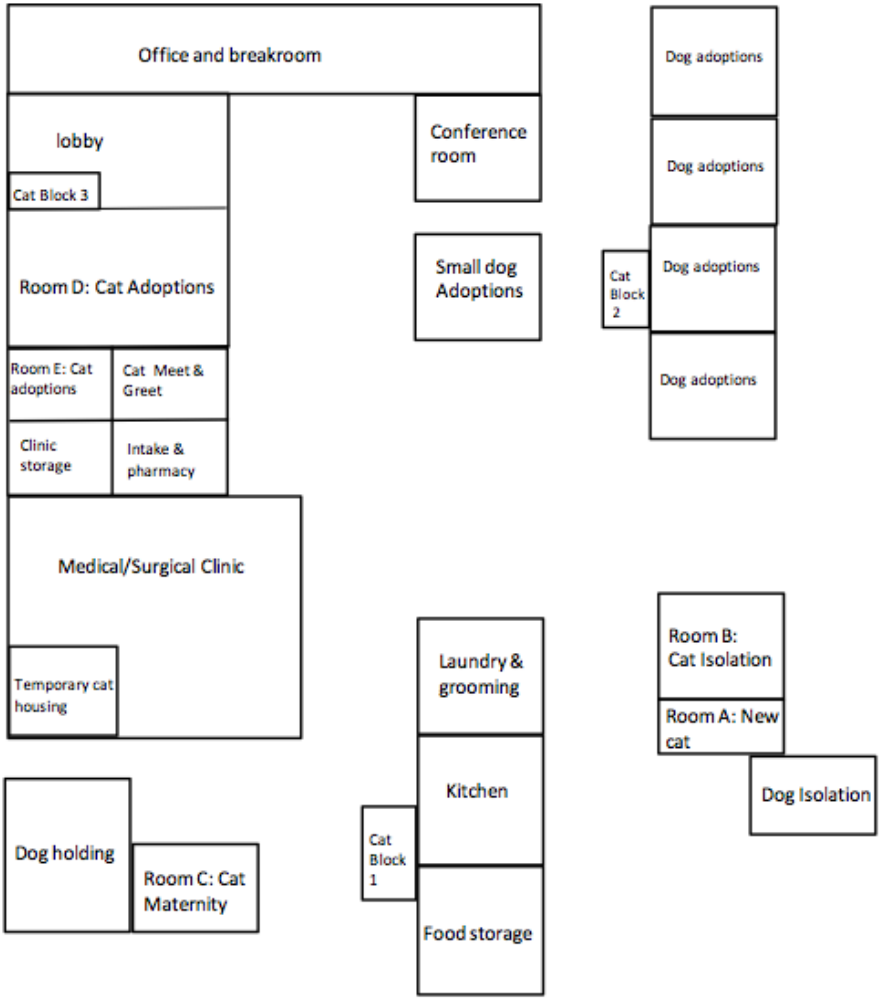


Figure 1. Layout of Shelter A

Timeline of Events

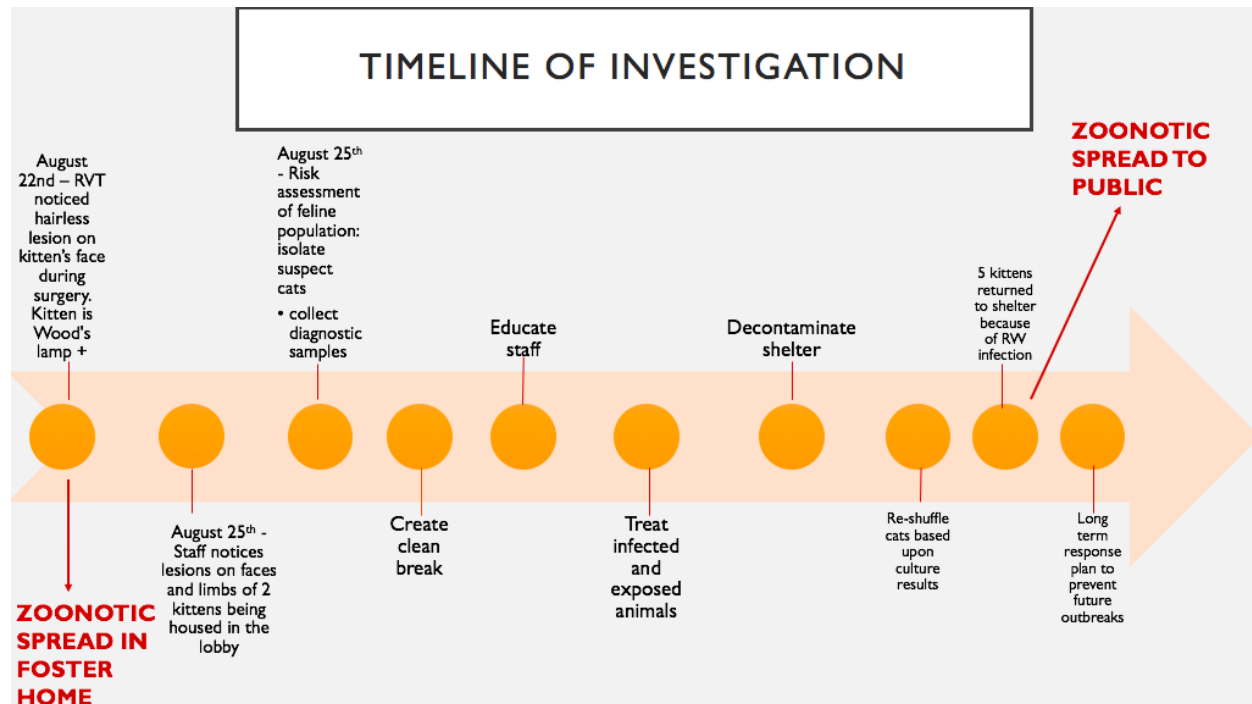


Figure 2. Illustrated timeline of ringworm outbreak investigation

8/22/16: A technician noticed a hairless lesion on an 8-week old kitten's pinna while prepping the kitten for ovariectomy. The kitten was Wood's lamp positive and hairs were collected for a dermatophyte test medium (DTM) culture. The kitten and its cagemate were moved into isolation in Room C. Records indicated this kitten came in as a stray 2 weeks prior but had been housed in foster care with a staff member since being processed at the shelter. The kitten was not tested for feline immunodeficiency virus or feline leukemia virus because the shelter did not routinely perform these tests (due to lack of trained staff, resources, and ability for follow-up testing in the case of a positive test result). It was unclear which rooms at the shelter (if any) had been contaminated. After tracing the ringworm positive kitten back to a foster home of one of the staff members, it was discovered that the other 13 kittens in this foster home also had lesions. Additionally, the staff member was recently diagnosed with a ringworm infection by her own physician. Three other kittens from this foster home were recently brought back to the shelter to be put up for adoption, two of which were placed in the adoption room and the other in the feline isolation room. This staff member did not alert her manager or other staff of her recently diagnosed ringworm infection.

8/25/16: Staff noticed circular crusted lesions on the faces and limbs of two kittens being housed in the lobby. An outbreak management plan was discussed with the shelter manager and staff, including the risk assessment, diagnostic testing, isolation and treatment of animals, decontamination of the shelter environment, and public safety measures. A risk assessment of the feline population dictated housing of cats based upon risk group. Treatment protocols were developed for each risk group which included lime-sulfur dips and oral anti-fungal medication (Table 3). Staff was advised to clean cages in order of ascending risk (i.e. low risk first); however this recommendation was likely rarely followed due to staffing inconsistencies and challenges with managerial oversight. Informational signs (Appendix) were posted on isolation and quarantine rooms to discourage unauthorized people from entering these rooms and to advise authorized personnel of how to prevent zoonotic spread of ringworm. Isolation room E was locked during visiting hours to prevent the public from entering but the cat adoptions room (which housed some moderate risk cats) was not closed off to the public during visiting hours. Unauthorized people were found in these rooms on multiple occasions.

A one-page handout was made available in the lobby to inform people of the zoonotic risks of ringworm and recommended precautions to take to prevent transmission of disease (Appendix).

9/24/16: A lesion was noticed on a kitten housed in the adoptions room (room D). DTM cultures for both the kitten and its littermate were positive. These kittens were then moved into isolation in room E and started on treatment. This raised concerns over staff compliance with the decontamination and biosecurity protocols, as both kittens had 2 consecutive negative cultures prior to appearance of the lesion. Despite designating certain staff members to be responsible for treating and caring for the ringworm cats, on multiple occasions members of the work-release program were seen caring for the cats in quarantine and isolation. These work-release individuals were not properly trained in biosecurity measures or zoonotic disease. Personal protective equipment was not worn during these instances, and when asked about ringworm, these individuals did not know about its zoonotic potential. This raised concerns over proper training and education of employees, volunteers, and work-release members on how to remain safe in the workplace. Five more kittens in room E developed positive DTM cultures and the environment was cultured including the floor and cat houses. These cultures were found to be negative, so it was suspected that kittens were becoming reinfected in this room due to lack of compliance with

the sanitation protocol and proper use of PPE. This room was originally designated a quarantine room, but became another isolation room after so many cats were positive on DTM.

9/27/16: The shelter manager was abruptly removed from his position, forcing an individual from the non-profit organization to take on temporary management responsibilities. This perpetuated the shelter's challenges with managerial oversight of employees and volunteers. It was discovered that many of the recommendations related to the ringworm outbreak were not appropriately communicated from the manager to the shelter staff, which explains some of the confusion seen in protocol adherence.

10/1/16: One kitten adopted prior to knowledge of the ringworm outbreak was returned upon suspicion of a ringworm infection. The new owner had been diagnosed with ringworm.

10/4/16: Three kittens adopted prior to knowledge of the ringworm outbreak were returned upon suspicion of a ringworm infection. Four people in the household, including 2 adults and 2 children, had been diagnosed with ringworm. They were overwhelmed with the financial and decontamination repercussions, so the shelter offered to take the kittens back for treatment and then return them to the adopting family once the ringworm had resolved.

11/2/16: All cats at the shelter (including the returned kittens) were cleared from ringworm. The dermatophyte outbreak was officially determined to be resolved after fungal cultures of both isolation rooms were negative.

The 13 foster kittens in the staff member's home were returned to the shelter after 2 consecutive negative DTM cultures

Assessment of Feline Population

Every cat at the shelter was examined for skin lesions and Wood's lamp tested, and then placed into high, moderate, or low risk groups (Table 1 and Figure 3). High and moderate risk cats were cultured on a dermatophyte culture medium (DTM) using the toothbrush technique (Frymus et al, 2013). Of the 83 cats at the shelter, 11 were categorized as high risk, 49 were moderate risk, and 23 were low risk. All 13 of the kittens in the foster home were categorized as high risk. Five kittens lacked proper identification, and several other cats had incorrect identifying information on their cages which complicated the investigation. Unidentified cats had to be re-admitted into the shelter computer system and were assigned new identification numbers.

Cats were re-arranged within the shelter according to risk groups. The staff was advised to refrain from moving any animals after the re-arrangement. High risk cats were moved to Room C, which became the ringworm isolation room due to its relatively isolated location. While the shelter has a room designated for isolation of infectious animals (Room B), the housing in this room was not appropriate to house cats for long periods of time. These enclosures did not meet ASV Shelter Guidelines for housing because they did not provide adequate room for urination/defecation, feeding, and resting. There is a strong correlation between improper housing and elevated stress, as well as between stress and disease (Möstl et al, 2013). Cats with high levels of stress are prone to developing infectious diseases or have prolonged recovery periods. Additionally, there are serious behavioral wellbeing concerns with inadequately sized cages, especially for long periods of time, as with ringworm treatment.

	Low Risk	Moderate Risk	High Risk
Age	>1 year	3 months-1 year	<3 months
Lesions	No lesions visible	Lesions visible	Lesions visible
Wood's Lamp Exam	Wood's lamp negative	Wood's lamp negative	Wood's lamp positive
Culture results P1= <4 colonies P2= 5-9 colonies P3= >9 colonies	P1	P2	P3

Table 1. Criteria for risk assessment of cats in the shelter

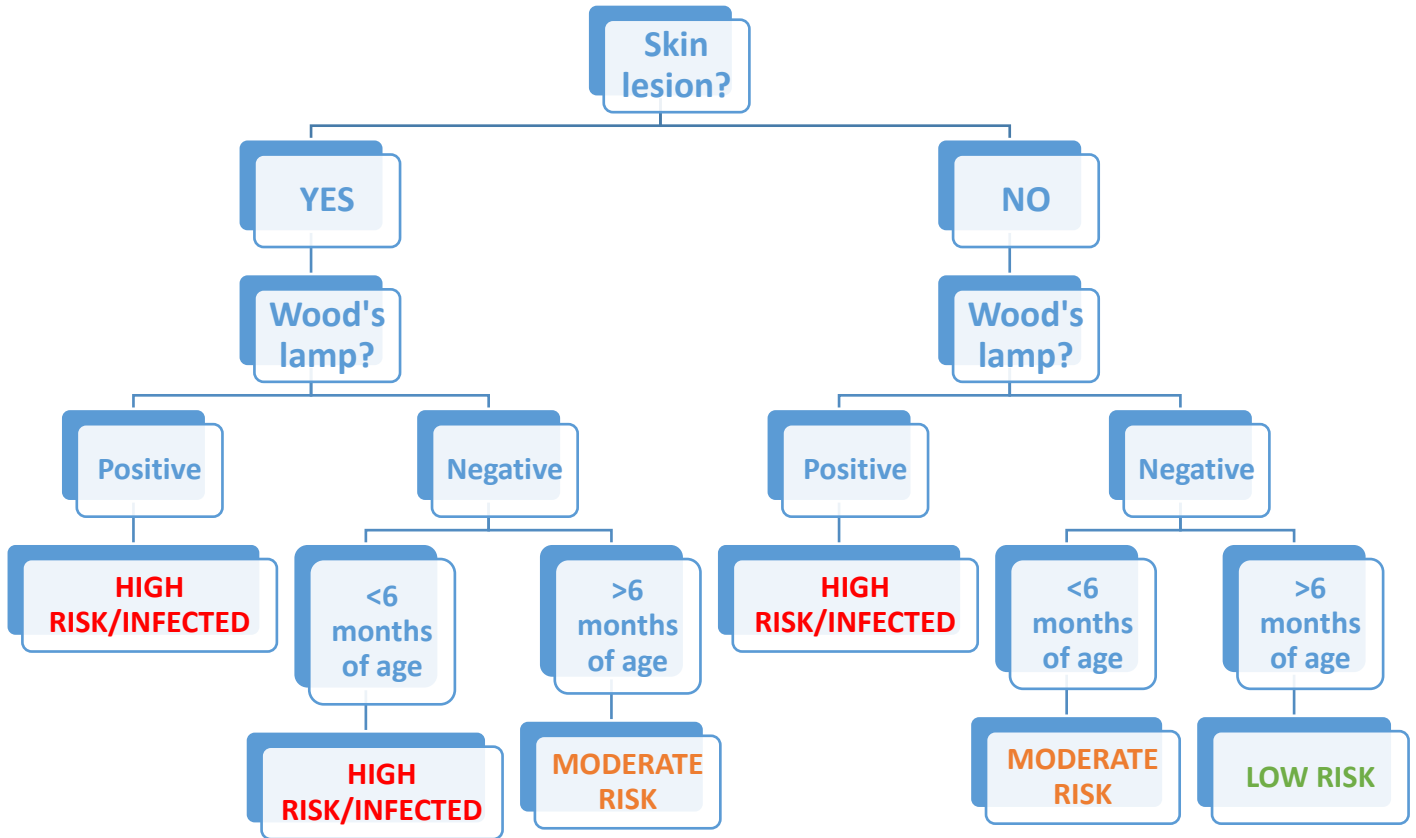
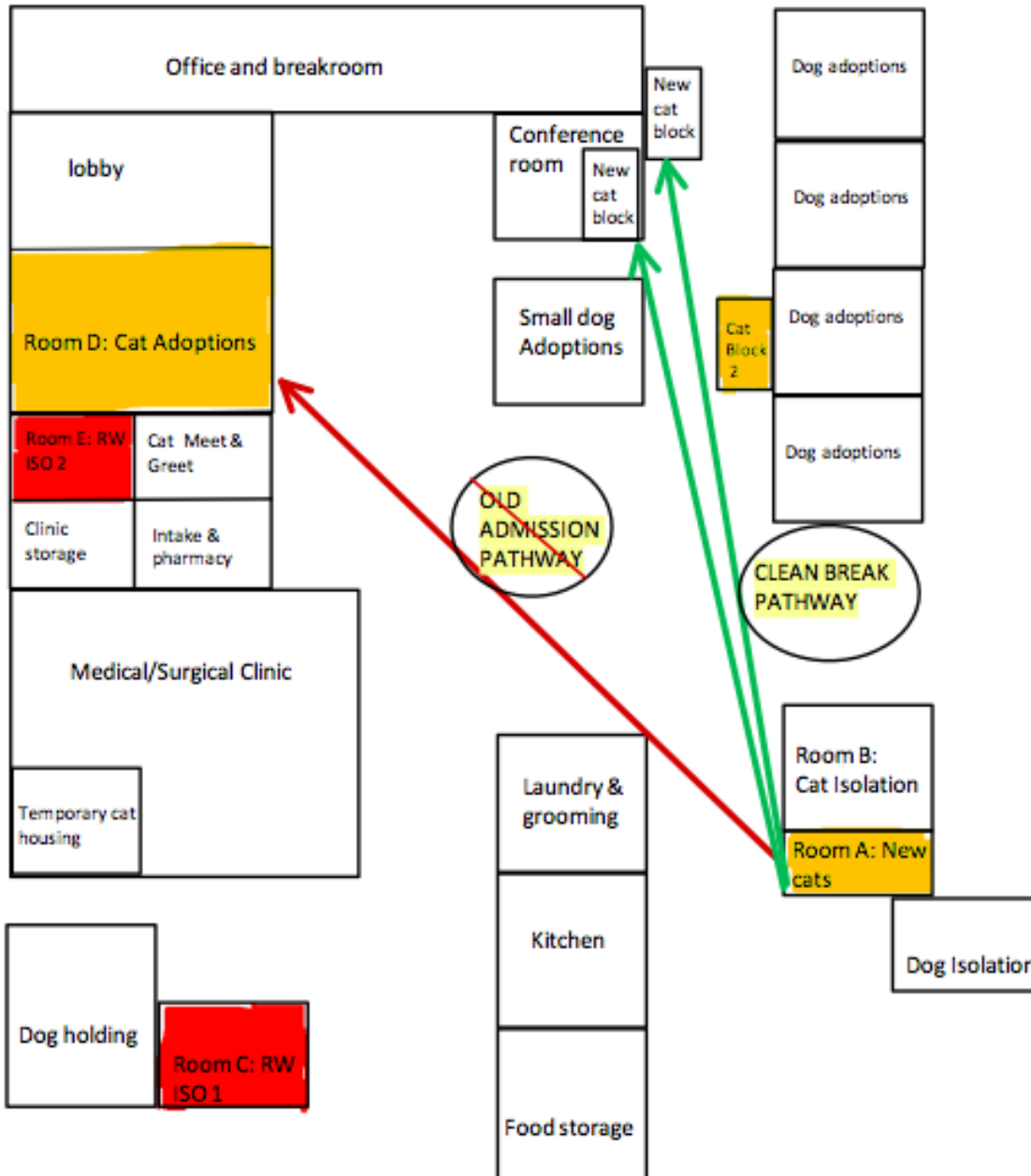


Figure 3. Ringworm risk assessment flowchart



Red color indicates RW isolation rooms with high-risk cats (isolation rooms)
 Orange color indicates rooms with moderate-risk cats (quarantine rooms)
 Cat blocks 1 and 3 were removed from the shelter after initial risk assessment

Figure 4. Illustration of the clean-break pathway

The clean break pathway allows new, unexposed cats to be housed in room A upon intake and then moved into temporary housing units located on the opposite side of the shelter from the ringworm-infected cat adoption and isolation rooms.

Case Management and Treatment

Diagnostics

High and moderate risk cats were cultured on DTM plates using the toothbrush technique (Frymus et al, 2013). The cultures were taped closed and incubated in a closed plastic container which was then tied closed into a plastic bag. Temperature and humidity levels within the cat housing units in Room D (cat adoptions) were measured and found to be 72 °F and 43% humidity, which is favorable for ringworm growth (Greene, 2012). The cultures were stored in a top-level cat housing unit with a sign stating not to touch. The cat housing units in Room D were not properly ventilated. Cultures were initially evaluated daily for color change. A microscopic exam was performed on cultures with any colony growth. Microscopic exams were performed using a tape prep of the growth onto a glass slide with a drop of lactophenol cotton blue. Slides were evaluated at 10x and 40x for presence of hyphae and macroconidia, and a pathogen score of 1-3 was assigned to each plate based upon the number of colonies seen (Table 2). Every high and medium risk cat was cultured once weekly until 2 consecutive negative cultures were obtained. At this point cultures were evaluated weekly based upon color change, colony growth, and microscopic examination. DTM plates were incubated for 21 days, even though cultures were considered negative if there was no growth by day 14.

Pathogen Score	# of colonies
P1	0-4 colonies
P2	5-9 colonies
P3	>9 colonies

Table 2. Pathogen score classification



Figure 5. Microscopic exam preparation



Figure 6. Microscopic exam showing macroconidia and hyphae

Medical

Cats determined to be positive for ringworm were treated with twice weekly lime-sulfur dips (1:16 concentration) as well as daily oral terbinafine. In the initial days after confirmation of the first positive cases, all cats in the shelter were lime-sulfur dipped, regardless of risk group. Cats in the medium and high-risk groups were cultured until 2 consecutive negative cultures were achieved. Upon negative classification, a skin exam and Wood's lamp exam was performed prior

to releasing a cat from isolation. Additionally, one final lime-sulfur dip was performed on medium and high-risk cats prior to re-entry into the adoption room.

HIGH RISK	MODERATE RISK	LOW RISK
Perform DTM cultures weekly until 2 consecutive negative cultures Lime-sulfur dips (1:16) every 3 days until cleared from isolation Oral terbinafine once daily <u>Wt range (kg)</u> <u>Dose</u> <2.8 ¼ tablet (62.5 mg) 2.8-5.5 ½ tablet (125 mg) >5.5 1 tablet (250 mg)	Perform DTM cultures weekly until 2 consecutive negative cultures Lime-sulfur dips (1:16) every 3 days until cleared from quarantine	Lime-sulfur dip (1:16) once

Table 3. Treatment for cats based upon risk classification

Doses came from: Moriello K CK, Trimmer A, Newbury S, Kunder D. Treatment of shelter cats with oral terbinafine and concurrent lime sulphur rinses. *Vet Dermatol* 2013;24:618-620

Zoonoses education

Upon confirmation of the first positive ringworm cases, staff was advised of the zoonotic risk of ringworm and verbally educated about how to protect themselves from infection. The shelter did not have sufficient supply of personal protective equipment (PPE) to get through the outbreak, so more disposable gowns, gloves, booties, and bouffant caps were ordered. Cleaning and feeding of the animals was typically the responsibility of volunteers or work-release individuals; however for consistency purposes it was decided to designate a few selected staff members to handle the care and treatment of the ringworm cats. Veterinary student volunteers were recruited and trained for daily and bi-weekly cleaning, feeding, and medication for the first 2 months of the outbreak due to inadequate staff numbers at the shelter. Training sessions were held to educate staff members how to appropriately wear PPE and keep themselves safe while handling cats at the shelter. These staff members were advised to wear full PPE whenever entering a room housing ringworm cats. Signs were posted on all rooms containing high and moderate risk cats warning people of the zoonotic risks and what precautions to take before entering the rooms (Appendix). The public was prohibited from entering rooms E and C; however room D was kept open during adoption hours. A 1-page informational handout about ringworm was created and placed in the reception area to provide to the public (Appendix). It was recommended to halt all

cat adoptions during the outbreak to reduce the risk of zoonotic spread to the public. This was not done, and cats were continuously adopted during the outbreak. New adopters were required to sign a ringworm waiver form acknowledging the risk and advising them to monitor for any clinical signs and seek medical attention if any concerns arose.

Environmental control

After the initial assessment of the shelter, staff was advised to thoroughly clean the shelter with a special focus on places where high-risk cats were known to have been, including Room B (the shelter's designated isolation room) and the temporary cat cages that were in the lobby and hallways. It was recommended to have one Swiffer mop (or other electrostatic cleaner) designated for each room to be used to sweep the floors daily to remove all hairs (including under the cages). After each cat was lime-sulfur dipped, their cage was thoroughly cleaned and disinfected using a 1:32 sodium hypochlorite solution with 10 minutes of contact time. Staff was then instructed to spot-clean cages as needed to avoid stirring up hairs from bedding, which can be an easy way to spread spores. The triple cleaning technique was recommended to keep the environment clean:

1. Mechanical removal of hair, dirt, and debris
2. Washing affected area with detergent, followed by thorough rinsing
3. Disinfect with 1:32 sodium hypochlorite solution, allowing at least 10 minutes of contact time.

The following sanitation protocol was given to the shelter:

Daily Cleaning Steps

1. Spot clean cages daily unless heavily soiled. Spot cleaning minimizes disruption & reduces stress. Keep original bedding in cage unless heavily soiled. Bedding should be removed & replaced on days kittens receive lime sulfur topical treatment.
2. MINIMIZE how much you stir up spores through sweeping, moving bedding around, etc.
3. Used bedding should be washed separately from other laundry or discarded (See laundry protocol)
4. Use Swiffer to sweep floor, disinfect with 1:32 bleach dilution

5. It is important to remove all hairs and organic material from the floor BEFORE disinfecting with bleach
6. Use a new, clean Swiffer® pad each time floor is cleaned, discard after use
7. Disinfect cages and all surfaces in the room twice weekly with dilute bleach (1:32). This is done when kittens are removed from cage for lime sulfur dip. See Bi-weekly disinfection steps.
8. All toys should be discarded between kittens & not re-used unless can be completely disinfected.
9. All kittens should receive toys & other enrichment daily
10. Dishes & other washable items (including litter boxes) can be run through a dishwasher provided water temperature reaches at least 43.3° C (110° F)
11. If litter boxes cannot be properly washed &/or if they have rough surfaces that cannot be adequately cleaned, they should be discarded
12. Consider using disposable litter boxes

Bi-Weekly Disinfection Steps

1. Prepare **1:32** bleach dilution (see bleach dilution protocol)
2. Label date bleach is diluted & prepared
3. Store away from light & replace every 24 hours
4. Use a damp rag to remove all hair and organic material within the cage.
5. Removal of hair is **KEY** to removing ringworm spores from the environment
6. This is done when kittens are removed from cage for lime sulfur dip
7. You can clean the cage or surface with a cleaning agent (**DO NOT** use an **AMMONIA** compound, when mixed with bleach this creates a toxic gas)
8. Spray cage with bleach disinfectant, allow it to contact the surface for **10 minutes**
9. Rinse the cage with water & dry surface completely before placing bedding & kittens back in cage
10. The ringworm isolation room should be thoroughly cleaned when it is empty. Follow same steps as above. Fumes are toxic - Staff should wear gloves, gown, eye protection and a mask both when mixing the bleach & during disinfection. Staff should avoid

inhaling the bleach aerosol & room should be adequately ventilated prior to housing other animals.

Steps to Wash Bedding

1. Bedding should only be removed & replaced on days kittens receive lime sulfur topical treatment, unless heavily soiled.
2. Place laundry in plastic bag to keep ringworm spores from being spread throughout shelter when taking bedding to laundry room
3. Do not overfill washing machine as this reduces machine's ability to mechanically remove ringworm spores. Wash on hot water cycle (preferably >105 degrees Fahrenheit), dry on high heat.
4. After removing laundry from dryer, clean lint filter (be sure to do this EVERY time)

Steps to manage ringworm in a foster home or private home

1. All non-porous surfaces should be damp mopped, Swiffered® and/or vacuumed (to gather up infectious hairs) and disinfected with bleach or accelerated hydrogen peroxide (Rescue). This includes floors, walls, countertops, windowsills, and carriers.
2. Rugs should be vacuumed twice daily. Vacuum cleaner bags should be regularly discarded.
3. Bedding and protective clothing should be changed daily, and laundered separately in hot water with a quarter cup of bleach and dried in a dryer (or discarded)

Additional steps to consider:

1. All exposed animals should be tested for ringworm as described above to make sure they are not sub-clinically affected
2. All exposed bedding, toys, brushes, etc. should be laundered/dried or discarded
3. All non-porous surfaces should be thoroughly cleaned and disinfected where possible with bleach (1:32 dilution) or Rescue®. This should be repeated at least twice. If bleach is used, it must be applied to a pre-cleaned surface and be rinsed off after sufficient contact time (at least 10 minutes of wet contact).

4. All exposed carpets and furniture should be vacuumed daily for one week, and the vacuum cleaner bags discarded daily
5. All heating and cooling vents should be vacuumed, or filters replaced. It is not usually necessary to have ducts commercially cleaned.
6. Carpets should be commercially steam cleaned. Steam cleaning with cleaners that use hot tap water is ineffective, as the water does not reach a high enough temperature.
7. Clothing that was worn when in contact with the cats should be washed in hot water with bleach, then dried in a dryer or by hanging in sunlight.
8. Environmental cultures should be performed to verify success of decontamination prior to re-opening the foster home to new animals

Results

Total cats cultured: 84 (71 in shelter, 13 in foster)

Total ringworm positive: 47 (34 in shelter, 13 in foster)

Total duration of outbreak: 75 days

Number of known human ringworm infections acquired after contact with cats at the shelter: 5

Number of cats returned to shelter due to ringworm: 5

Preventative measures

Upon realization of the scope of the ringworm outbreak, the shelter was advised to temporarily halt all intake and adoptions of cats to prevent further spread of disease among animals and humans. This was not done, so efforts were made to keep the outbreak contained and the public informed. A “clean break” pathway was created to attempt to prevent new incoming cats from being exposed to ringworm (Figure 4). Shelter staff was advised to screen incoming cats for ringworm by perform a Wood’s lamp examination during intake; however the shelter did not have sufficient support staff to adequately perform all daily tasks and this recommendation was not consistently followed.

Many of the staff members were generally uneducated about ringworm, so this outbreak was used as an opportunity inform them about the disease and what they should be doing to protect themselves from becoming infected. Flyers were posted around the shelter (particularly around

the ringworm isolation room and the cat room) informing staff and visitors of the risk of ringworm transmission and preventative measures to take to avoid infection. Staff was advised to be transparent with visitors about the ringworm outbreak and to educate people about the potential for zoonosis. Personal protective equipment was placed at the entrance to the ringworm isolation room, and signs were posted advising unauthorized people to not enter.

Discussion

There are many contributing factors to this shelter's ringworm outbreak. The main reasons can be broken into 4 main categories: lack of protocols, insufficient training and oversight of staff and volunteers, inappropriate housing for cats, and lack of formal foster program. Interestingly, a public health assessment of this shelter was underway as this ringworm outbreak began. The daily operations of the shelter were observed and assessed regarding public health and safety. One of the major points addressed in the public health assessment was the lack of an infection-control plan or disease outbreak protocols. Written protocols provide a standardized plan for events, such as an infectious disease outbreak. Another concern noted in the public health assessment was the lack of zoonotic disease training for staff and volunteers. Staff and volunteers should be provided zoonotic disease training so they are able to clinical signs and initiate protocols to prevent spread of disease. In this case, staff and volunteers did not know what steps to take to control the ringworm outbreak or to keep themselves safe from disease. Due to lack of education and training about ringworm and zoonotic diseases in general, shelter workers experienced various levels of fear which may have impacted their care of the cats. Some cats were being handled without proper PPE due to lack of understanding of how the disease is spread. An effort was made to educate staff and volunteers about the potential for zoonotic transmission and what could be done to prevent infection in humans. Additionally, efforts were made to make sure the staff received correct information about ringworm and that they knew it was a very mild, treatable, non-fatal skin disease in humans and animals. It was important that staff knew they were protected from infection if they wore proper PPE. As observed during the public health consult, PPE was not always worn appropriately, which is one of the reasons cats were becoming re-infected in the shelter.

At the time of the outbreak, cats were being housed in several locations throughout the shelter including the lobby, the main cat room, multiple hallways throughout the shelter, the isolation room, and the quarantine room. Animals were frequently moved throughout the shelter for no apparent reason and litters of kittens were mixed without oversight from management or a risk/benefit analysis. Due to lack of diligent record keeping, it was impossible to trace back the path the first positive ringworm kittens took through the shelter. For this reason, the entire cat population was assessed for ringworm. Kittens housed in the lobby were among the first animals to develop ringworm lesions. This is problematic because everyone who walks through the lobby risks picking up spores on their clothes and shoes and spreading disease to the rest of the shelter. Additionally, visitors are more likely to interact with these kittens since they are out in the open, which represents a public health risk. No signs were displayed discouraging visitors from touching the animals.

For multiple reasons, this shelter suffered from insufficient oversight. At the time of the outbreak, the shelter was in a transitional phase of deciding which organization was responsible for different aspects of the shelter. This may have contributed to the severity of the ringworm outbreak, as it was not clear who oversaw decision making. This also reflects a need for an infection-control manual. Even when recommendations were made from outside sources (the veterinarian), staff were not held accountable for implementing those recommendations. This could have impacted the severity and duration of the outbreak.

Some staff members and volunteers felt obligated to take too many animals home to foster due to lack of a developed community-based foster program and an unfounded lack of trust by some staff in the public to provide appropriate care for foster animals. This can lead to overcrowding in individuals' homes, which was the case with the staff member with the ringworm-infected home. To reduce risk of disease outbreaks, kittens from different litters should not be mixed and no individual foster home should house more animals than is allowed by their resources.

Recommendations to prevent future ringworm outbreaks

1. Utilize an infection control plan to manage infectious disease outbreaks at the shelter

2. Provide zoonotic disease education to staff and volunteers upon hire, and offer refresher courses at least once per calendar year
3. Provide appropriate personal protective equipment to staff and volunteers and enforce its utilization
4. Upon intake, screen all cats for ringworm with a Wood's lamp exam. Positive cats should be placed in isolation and further tested with a DTM culture
5. Do not house animals in the lobby

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Chapter 4 - Results

Public Health Risks in Animal Shelters

Public health risks in animal shelters can be divided into three major categories:

1. Zoonoses
2. Animal-related injuries
3. Personal Safety

Zoonoses

While there are many infectious diseases affecting companion animals, special consideration should be given to those that share a spectrum of infectiousness with humans. Diseases transmitted from animals to humans are classified as zoonotic, and can be transmitted between species via direct contact or vectors, such as mosquitoes, ticks, flies, and fleas (Day et al, 2012).

Zoonotic diseases of concern in animal shelters include:

1. American trypanosomiasis
2. Bartonellosis
3. Brucellosis
4. Bubonic plague
5. Campylobacteriosis
6. Dermatophytosis
7. Giardiasis
8. Leptospirosis
9. Lyme borreliosis
10. Rabies
11. Rickettsioses
12. Salmonellosis
13. Scabies
14. Toxocariasis
15. Toxoplasmosis

16. Tularemia

Many of these diseases are quite rare, but others are common and often underdiagnosed. Animals housed in a shelter settings are at an increased risk of infectious disease due to overcrowding, high animal turnover, increased stress, and poor hygiene. Shelter animals are usually confined to small areas within densely packed rooms, which creates an environment of increased exposure, susceptibility, and transmission of infectious disease (Pesavento & Murphy, 2014). One survey reported that 45% of animals have an infectious disease upon entering a shelter (Steneroden, Hill, & Salman 2011). Free-roaming cats and dogs usually have no history of veterinary care before entering the shelter, which makes them a reservoir for existing and new, emerging zoonoses. These free-roaming animals may have close associations with wildlife which adds additional risk of pathogen transfer (Day et al, 2012). Upon intake of a new animal, a trained shelter worker should examine the animal while wearing appropriate PPE in an isolation room away from the general population of animals. If the animal is suspected of having a potentially infectious disease, the animal should remain isolated from the population and the room should be carefully cleaned and disinfected. This initial health evaluation should be carefully documented so the animal's disease status can be monitored throughout its stay at the shelter.

Canine and feline parvovirus and respiratory infections are the most common contagious diseases afflicting shelters; however arguably more attention should be given to zoonotic diseases because these diseases not only represent a risk for the animals, but also the shelter workers and general public. Companion animals may act as sentinel species for emerging diseases in human populations, such as the emergence of borreliosis or rickettsioses in newly emergent areas (Day et al, 2012). In a 2014 study, Tenney et al indicated shelter dogs in Texas can be used as an assessment of local transmission risk for Chagas disease, which has been increasingly diagnosed in humans in the southern US.

The ramifications of a zoonotic disease outbreak in an animal shelter include financial costs, emotional strain, negative media attention, affected animal health, affected human health, and possibly loss of life. Disease management in a shelter setting requires a multifaceted approach and is dependent on shelter resources. Key strategies to infectious disease control in an animal shelter include: 1) population management and stress reduction; 2) vaccination of all dogs and

cats on intake; 3) effective cleaning and disinfection; 4) segregation of juveniles from adults; 5) diagnosis; 6) removal of infected animals from the population and quarantine of exposed animals (Crawford). These strategies require cooperation and involvement from shelter staff and volunteers. If animals are more likely to contract a zoonotic disease in a shelter, then people working or visiting the shelter can be considered at a higher risk of contracting a zoonotic disease. Specific preventative measures should be taken by people in contact with shelter animals to prevent transmission of zoonotic disease, and should address direct, aerosol, and vector-borne transmission. Those preventative measures include:

1. Hand hygiene
2. Proper use of personal protective equipment (PPE)
3. Zoonotic disease training

Hand Hygiene

Hand hygiene is a general term referring to any action of hand cleansing (WHO, 2009). In a small animal shelter setting, this is usually accomplished by hand washing with soap and water or using an alcohol-based hand rub (NASPHV, 2011). Practicing good hand hygiene includes washing hands with soap and water for at least 20 seconds when hands are visibly soiled, or employing the use of an alcohol-based hand rub containing 60-90% isopropyl alcohol or ethyl if hands are not visibly soiled. The National Association of State Public Health veterinarians recommends in *The Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention* that hands be washed in between examinations of individual animals or groups of animals (litters) and after contact with feces, body fluids, vomitus, exudates, or articles contaminated by these substances. There is considerable evidence that proper hand hygiene practices reduce risk of infectious diseases among humans, and therefore these practices are an indispensable preventative measure for disease transmission (Aiello & Larson, 2002; Bloomfield et al, 2007). Hand washing stations (either sinks with running water, soap, and paper towels) or hand rub dispensers should be placed in every room where animals are housed or examined. Additionally, there should be proper signage and instruction at each station to encourage staff, volunteers, and the public to engage in frequent and proper hand hygiene.

PPE

Personal protective equipment (PPE) offers barrier protection between a human and a pathogen. The type of exposure, the durability of the PPE for the task, and the fit should all be considered when deciding which PPE to wear (OSHA). The simplest form of PPE, and probably the form most commonly used, is gloves. Disposable gloves (latex, nitrile, or vinyl) should be worn when handling any animal suspected of having an infectious disease and when contact with feces, body fluids, vomitus, exudates, and nonintact skin is likely (NAPHV, 2011). The most frequent use of gloves in an animal shelter should be during cleaning, as contact with dirty cages, laundry, litter boxes, and soiled surfaces present opportunities for disease transmission. Gloves should be changed between handling of individual animals or animal groups (litters), including in between cleaning cat cages and a “clean to dirty” infection control principle should be used (CDC). Hands should be washed immediately following glove removal, as microperforations or unknown contamination during glove removal are potential causes for pathogen transmission. As with all PPE, gloves are only protective if worn correctly. Touch contamination should be avoided by not touching contaminated gloves to exposed skin. Other forms of PPE include facial protection, respiratory tract protection, and protective outerwear. In animal shelters, protective outerwear, such as disposable nonsterile gowns and shoe covers, should be worn when any pathogen that spreads via direct contact is suspected (ringworm, scabies). Gowns should fit correctly, which includes full coverage of the torso and arms down to the wrists (CDC). Disposable head covers (such as bouffant caps) provide a barrier from contamination of the hair and scalp. As with disposable gloves, protective outerwear should not be reused and should be changed in between contact with healthy and sick patients.

Workers should be trained on the correct way to don, use, and remove PPE. PPE should be donned before exposure to the patient and in a practical order: gown, mask or respirator, goggles or face shield, and finally gloves. PPE should be removed in an order that minimizes opportunities for self-contamination: gloves first, followed by face shield or goggles, gown, and finally mask or respirator. PPE should be removed and disposed of at the doorway immediately before leaving the room (CDC).

Some tasks carry inherent risks of zoonotic disease transmission, and therefore should only be carried out by trained staff members. This includes preparation of rabies-suspect

specimens for testing. Staff members who have received pre-exposure prophylaxis should be the only personnel responsible for these activities.

Zoonotic Disease Training

Employing well-trained and well-educated staff in animal shelters is paramount to an effective infection-control plan. Shelter staff have close interactions with animals daily and should be trained to recognize signs of disease to ensure best public health practices and appropriate isolation of diseased animals in a timely manner. One survey of shelters in the western US indicated 86% of shelter staff and 52% of shelter volunteers receive training on how to recognize clinical signs of zoonotic diseases (Steneroden, Hill, & Salman 2011). However, only 13% of shelters reported having an infection-control manual. Infection-control manuals help ensure that all staff and volunteers have consistent standards and expectations of how to manage an infectious disease outbreak, which is especially important for zoonotic diseases. Written protocols provide shelter workers with a basis for zoonotic disease training and can be a useful reference to teach good public health practices. Shelter-run training sessions at the time of hire and then again once yearly would allow for consistency of procedures and increased safety among workers, which is critical for controlling a zoonotic disease outbreak. An additional measure that can increase worker, volunteer, and visitor awareness of zoonotic disease risks at shelters is informational posters, signs, and handouts at the facilities.

Animal-related Injuries

One of the most obvious public health risks in animal shelters is animal-related injuries. Possible reasons for increased animal-related injuries in animal shelters include interactions with aggressive animals, lack of appropriate animal handling amongst shelter staff, and errors in identifying or housing quarantined animals. Animals relinquished to shelters are often done so due to behavioral problems. Hennesey et al used plasma cortisol concentrations during the first 3 days at a shelter to indicate high stress levels in dogs, which is of concern because stressed animals may be more likely to display aggressive behaviors. Kruk et al showed that mice with activated hypothalamus-pituitary axes had increased sensitivity to stimulation of their

hypothalamic attack areas. Other animals entering shelters are taken in as strays without a previous history and are potentially more likely to be unsocialized.

Bites and scratches present a substantial public health risk in animal shelters (NASPHV, 2011). One study analyzed accident insurance data over a period of 5 years to quantify and classify the types of injuries sustained by veterinarians and their staff. Results were compared against accidents in the workplace for general practitioners of human medicine, and not surprisingly, veterinary workers had an accident rate of 2.9 times that of human medicine. The survey found that 66% of reported accidents were due to scratches, bites, or kicks from animals (Nienhaus, Skudlik, & Seidler 2005). Quantitative information of injuries sustained to visitors in animal shelters is lacking, but if the public is interacting with animals outside of confined cages, risk of injury does exist.

Measures should be taken to reduce animal-related injuries in shelters. Guillotine-style animal housing units minimize human-animal contact during feeding and cleaning of cages and allow for shelter workers or volunteers to safely perform husbandry duties, even with dangerous animals. Cat housing units with partitions or feral cat boxes are used with the same logic: minimize risk of animal-related injuries. If human-animal interaction is necessary for transportation or medical care, safety equipment should be made available to trained staff to remain safe around fractious animals. Dangerous animals should be housed in a section of the shelter that is not accessible to the public, and rooms and individual cages should clearly identify the animals as dangerous. Animals not deemed as “dangerous” can still present risks to visitors, and for this reason all interactions with animals should be supervised by a staff member.

Personal Safety

Shelter workers are faced with many personal safety hazards while on the job, including chemical and physical hazards. These hazards should be addressed in a safety manual to ensure appropriate precautions are taken. The most effective way to protect employees from hazards is to eliminate the hazard all together. If elimination is not possible, management should make every attempt to minimize the hazards by way of substitution, engineering controls, administrative controls, and personal protective equipment.

Common chemical hazards in animal shelters include cleaning agents, hazardous drugs, latex, waste anesthetic gases, and pesticides (CDC). Training employees and volunteers to recognize these hazards is critical to improve public health practices. Caution should be taken to never mix cleaning products containing bleach and ammonia, as this creates a toxic gas. Employees should also know where all material safety data sheets are, how to read them, and what to do in the event of chemical contamination. Personal protective equipment should be provided for staff who are required to handle chemicals, as with dilutions of cleaning agents. Latex-free gloves should be stocked to provide protection for those with latex allergies.

Physical hazards in animal shelters include wet floors, loud noises, and accidental needle sticks. Shelters can take measurable actions to address physical hazards by ensuring employees are trained and protocols are followed. Wet floors should always be identified with a prominently placed sign to caution people about the risk of slipping. Floors should be mopped at intervals during which public access to the shelter is limited to avoid unnecessary risk. The presence of barking dogs may require noise abatement equipment, such as ear plugs, for kennel staff. Training should be provided to staff required to handle needles and sharps disposal containers should be conveniently located and frequently replaced.

Public Health Consults of Two Animal Shelters

Shelter A

Shelter A encompasses multiple organizations working in partnership to operate the shelter: the city's animal control division and several non-profit organizations. They operate under a managed admission policy. Shelter A was in a time of transition during this consultation. They heavily rely on the help from volunteers and individuals on work-release (i.e. mandated community service) for day-to-day operations of the shelter. On top of their managerial reorganization challenges, constant turn-over of animal-care workers makes implementing new policies difficult, although not impossible. High turnover of shelter volunteers and work-release individuals makes the need for stringent protocols and training necessary to ensure good public health practices. This public health consult focused on assessing the shelter's attention to and practices of personal safety, animal-related injuries, and zoonoses.

Shelter Consultation Report

Date: July 2016

SHELTER A

Kansas State University
Kelly Voss

CONFIDENTIAL
Veterinary Client Information

CONSULTANT TEAM

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COVER LETTER

To Whom It May Concern:

This document contains information gathered from observations of public health practices at Shelter A during the summer of 2016. Strengths and concerns have been identified, and recommendations made on how to improve the shelter's public health practices. Useful resources have been included at the end of the report.

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Public Health

LEAD CONSULTANT: KELLY VOSS

According to the ASV Guidelines, animal shelters must take necessary precautions to protect public health and safety.

Observations and recommendations are divided into the following topics or subsections:

- Personal safety
- Animal related injuries
- Zoonotic disease

PERSONAL SAFETY

According to the ASV Guidelines, "Animal shelters must maintain compliance with federal and state occupational and safety regulations regarding chemical, biological, and physical hazards in the workplace."

Strengths Observed

- OSHA posters were clearly posted in the break room, informing staff and volunteers of federal and state employee rights.** Information about safety and health in the workplace is provided to staff and volunteers.
- Hand sanitizer dispensers distributed throughout the shelter.** Providing numerous hand sanitizing opportunities to staff, volunteers, and the public is a critical component to improving personal safety. Hand sanitizing stations contained a sanitizer with at least 60% alcohol.
- Adequate number of sharps containers were available for sharps disposal.** The shelter provided appropriately placed sharps containers to facilitate safe disposal.

Concerns Identified

- **There was no written safety manual for the shelter.** A Volunteer Training packet existed, but it only included information about animal handling.
- **Secondary container labels did not match Material Safety Data Sheets.** MSDS were in the back of the shelter where bottles are refilled; however, spray bottles were not all appropriately labeled with hazard warnings from the MSDS according to OSHA standards. Staff was often unsure of hazards of chemicals used in the shelter and unsure of what to do in the event of a spill or skin/eye contact.
- **Staff smoked outside of the shelter.** There was one sign prohibiting smoking within 20 feet of the building, but it did not deter workers from smoking anyways.
- **Proper personal protective equipment was not always worn by staff and volunteers during chemical mixing.** Gloves were available near the chemical mixing area; however, staff were not seen using them. There are no written protocols posted in the area to provide directions in case of accidental chemical exposure. Usually staff or volunteers do not dilute disinfectants or cleaning solutions because the cleaner comes pre-diluted. They use concentrated cleaner to fill the mop bucket and there were no protocols about how to do this.
- **Proper personal protective equipment was not always properly utilized by staff and volunteers during animal handling and sanitation.** Staff and volunteers wore latex gloves during sanitation of animal housing areas, but gloves were not always changed between animals. Face masks were not readily available. Gowns and shoe covers were available for isolation rooms. Staff and volunteers were occasionally seen touching door handles with contaminated gloves. On intake of new animals, gloves were not worn by staff members handling the incoming animals.
- **Hand sanitation was not consistently accomplished at appropriate times.** Staff, volunteers, and visitors were observed to occasionally miss important hand washing opportunities, such as after leaving an animal housing area, handling animals, or before eating/drinking/touching their face. Encouraging and educational signs about the importance of hand sanitation were lacking throughout the shelter and adoption area, even at hand sanitizing stations.

Recommendations

- 1 | **Develop a more thoroughly written safety manual for the shelter.** This would greatly improve the shelter's consistency of worker and volunteer training and would help to identify safety hazards that people should be aware of.
- 2 | **Ensure all spray bottles and chemical agents are properly labeled according to OSHA standards and have accompanying material safety data sheets where employees can familiarize themselves with safety requirements for chemicals used in the shelter.** Unlabeled spray bottles

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pose personal safety risks to workers and volunteers because hazardous chemicals may inadvertently be mixed together to create dangerous compounds. Bottles containing chemical hazards should be labeled with warnings from the MSDS to include health, flammability and reactivity hazards. Additionally, MSDS are important to have accessible in the event of skin or eye contact with the chemical. OSHA provides standards for chemical safety in the cleaning industry that applies to animal shelters.

- 3 | **Enforce the “No Smoking within 20 feet of the building” policy.** California Government Code 7597 states that “No public employee or member of the public shall smoke a tobacco product inside a public building, or in an outdoor area within 20 feet of a main exit, entrance, or operable window of a public building.” The shelter is appropriately signed with “No smoking within 20 ft of this building” however staff is not always compliant. Limiting human and animal exposure to tobacco smoke is recommended.
- 4 | **Provide personal protective equipment (PPE) for staff and volunteers, as well as training to ensure it is worn at appropriate times.** Staff should be trained on proper use of PPE. PPE is essential to limit disease transmission among animals as well as transmission of disease to humans. A detailed policy on PPE requirements should be outlined in a Safety Manual. At minimum, gloves should be required to be worn when handling any animal suspected of having an infectious disease and when contact with feces, bodily fluids, vomitus, exudates, and non-intact skin is likely. Additionally, gloves should be worn when handling animals with unknown or incomplete histories, such as during intake exams. Gloves should be changed between handling individual animals or groups of animals. Staff should be trained to remove PPE before leaving the room to avoid contaminating the environment, such as door handles. Additional training should be provided for handling animals with suspected or known zoonotic diseases. Gowns, gloves, protective footwear, and masks should be provided and required when handling animals in isolation or cleaning isolation rooms. PPE requirements while handling chemical agents, such as during cleaning or preparation of cleaning agents, should be outlined in the Safety Manual. Employees should be required to wear gloves, face masks, and protective eyewear when mixing or diluting chemicals.
- 5 | **Informational signs regarding proper hand sanitation and public health risks should be posted throughout the shelter to improve compliance and frequency of hand sanitation.** Encouraging staff, volunteers, and visitors to wash their hands correctly and frequently can help to prevent disease exposure and transmission. Informational signs should be posted near animal handling areas and hand sanitizing stations.

ANIMAL-RELATED INJURIES

According to the ASV Guidelines, animal shelters should provide policies, training, and equipment necessary to prevent and minimize risk of animal-related injuries.

Strengths Observed

- **Sanitation of housing units for dogs and cats does not always require animal handling.** Guillotine-style kennels for large dogs and divider slots for cat cages allow for sanitation of housing with little to animal handling. However, some of the cat cages had malfunctioning divider slots which prohibited sectioning of animals.
- **Dangerous animals are sufficiently separated from parts of the shelter accessible to volunteers and the public.** Dangerous animals and rabies quarantined animals are housed in the back of the shelter in a room clearly marked "Quarantine." This room is locked and only certain staff members have key access. However, some rabies quarantined animals were also housed in the isolation room in cages that are not clearly marked. This room is not locked.
- **Meet & Greet areas are supervised by staff.** Staff oversees animal introductions to visitors within the animal housing areas.
- **Safety equipment is available for handling fractious animals, including control poles, muzzles, leather gloves, nets, and feral cat boxes.** All animal handling equipment is kept in the medical room.
- **The shelter vaccinates animals for rabies prior to adoption.** If an animal is adopted prior to 12 weeks of age, the shelter requires that the animal be vaccinated after adoption when it is old enough.

Concerns Identified

- **There is no posted policy for handling animals, including those with behavioral concerns that may result in human injury.** The volunteer handbook addresses handling animals with behavioral issues; however, this is not readily available to everyone in the shelter, including visitors. Some identification cards are marked with a red crosshatch, but there is no posted information about what this means.
- **Employees that handle dogs, cats, and wildlife are not all vaccinated against rabies.** The shelter only requires that animal control officers are vaccinated against rabies, and yet employees and volunteers are often the ones taking care of these animals or preparing rabies test submissions and are therefore most at risk.

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- **Quarantined cats were sometimes housed in the isolation room.** The “due out” dates on quarantined animals were observed to be out of date. These animals should be checked up on regularly to ensure their quarantine is in accordance with local regulations, which is 10 days in San Bernardino County.
 - **There is no written policy about animal related injuries.** There is some information about animal-related injuries in the volunteer handbook, but not everyone has access to this or is given this information. Employees and volunteers didn’t always know what to do in the event of a bite or scratch.
 - **Staff and volunteers have not all received training in basic animal handling.** Some reported to be self-taught in animal handling, while others did receive informal training upon starting work at the shelter.

Recommendations

- 1 | **An animal-handling policy should be clearly posted for staff, volunteers, and visitors to see.** In addition, the Safety Manual should provide information for staff and volunteers about handling animals with behavioral concerns. Animals with behavioral issues should have clearly marked signage on their cages that can be understood by everyone. Dangerous animals should only be handled by trained staff members, preferably animal control officers.
- 2 | **Every employee or volunteer that handles potentially rabid animals should be vaccinated against rabies.** Only vaccinated staff should be allowed to perform intake exams on animals with unknown histories, as well as handle any wildlife brought into the shelter. Only trained, vaccinated staff members should be allowed to care for quarantined animals. The most common reservoir for rabies in California is bats, so special precautions should be taken when handling live or dead bats brought to the shelter. The Advisory Committee in Immunization Practices advises that all people who routinely work with companion animals or wildlife receive pre-exposure vaccinations against rabies.
- 3 | **Quarantined animals should be housed in a separate part of the shelter so that only properly vaccinated and trained staff have access to them.** Additionally, animals in isolation due to infectious disease should be housed separately from quarantined animals. “Due Out” dates on quarantined animals (10 days in San Bernardino County) should be acknowledged and animals should be removed from quarantine when their 10 days is up.
- 4 | **The written Safety Manual should include a policy about animal-related injuries.** Animal related injuries, such as bites and scratches, pose a serious risk to staff, volunteers, and visitors at the shelter. A written policy regarding procedures to be taken in the event of an animal-related injury

would increase reporting compliance and documentation of injuries at the shelter. Staff and volunteers should be made aware of what to do in the event of a bite or scratch so appropriate measures can be taken.

- 5 | **Staff and volunteers should be provided adequate training in basic animal handling.** Training opportunities to refresh and improve animal handling skills should be offered at various times throughout the year. Training should include recognition of dangerous animals, proper use of equipment to handle dangerous animals (for designated personnel only), and techniques to minimize animal-human contact when sanitizing cages.

ZOONOTIC DISEASE

According to the ASV Guidelines, animal shelters are responsible for training staff about zoonotic conditions, protecting the public from diseased animals, and informing visitors, adopters, and foster-care providers of zoonotic disease risks.

Strengths Observed

- Animals potentially infected with a zoonotic disease are housed in isolation.** This room is clearly marked to limit access. Volunteers have access to the room via a key card, but visitors do not.
- Animals are prophylactically dewormed upon intake.** Dogs and cats are administered Pyrantel pamoate during their intake exam, which controls for ascarids.

Concerns Identified

- There was no written policy for managing a zoonotic disease outbreak.** Staff and volunteers were mostly unsure of how to handle a zoonotic disease outbreak.
- Staff and volunteers do not receive any training on zoonotic pathogens.** No written zoonotic disease training policy exists to help educate staff and volunteers.
- There is a general lack of posted educational material warning staff, volunteers, and visitors of the potential of zoonotic disease transmission.** There are no zoonotic disease signs posted in the lobby, adoption stations, intake areas, housing areas, meet & greet areas, medical services area, or staff break room.

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- **Proper PPE was not always worn during sanitation of animals infected with a zoonotic disease.** Volunteers weren't always aware that animals they were handling were infected with a zoonotic disease.
 - **Information about zoonotic diseases is not always given to visitors, foster homes, or adopters.** One foster parent was infected with ringworm from shelter kittens in her foster care shortly after this consult.

Recommendations

- 1 | **Develop a written infection control protocol with special consideration given to zoonotic disease outbreaks.** Written guidelines of how to manage a zoonotic disease outbreak would help guide staff to take proper steps to ensuring the best infection control possible. Human safety should be the priority, and staff, volunteers, and the public should be adequately informed on how to protect their own health.
- 2 | **Implement a zoonotic disease training program for staff and volunteers.** Educating staff and volunteers about zoonotic diseases can help decrease animal-to-human disease transmission as well as decrease severity of disease outbreaks by means of early detection. Training should include recognition of clinical signs, modes of transmission, and species affected. Staff should be informed of how to respond when a zoonotic disease is suspected.
- 3 | **Educational material should be posted throughout the shelter to educate staff, volunteers, and visitors about the risks of zoonotic disease transmission.** Signs should be posted near animal handling areas, such as the adoptions room and meet n' greet areas. Signs should include information about commonly transmitted zoonotic diseases in companion animals, precautions to take to prevent transmission of disease, and clinical signs to look for.
- 4 | **Designate staff members to care for animals held in isolation.** Care and treatment of animals infected with a zoonotic disease should be the responsibility of specially trained staff members who know how to use required PPE. Volunteers and work-release personnel should not handle these animals unless properly trained. Animals with a suspected or confirmed zoonotic disease should be housed in an area with restricted access to prohibit public interaction.
- 5 | **Information about zoonotic diseases should be provided to visitors, adopters, and foster parents.** Informational pamphlets should be readily available in the reception area of the shelter. New adopters and foster parents should be educated about zoonotic disease risks their animals may present to humans in the household.

ADDITIONAL RESOURCES

American Humane Society. *Operational Guide for Animal Care and Control Agencies: Companion Animal Zoonotic Diseases*. This guide contains information about transmission and control of common companion animal zoonotic diseases.

Guidelines for Standards of Care in Animal Shelters. This document contains the standards from which I based my recommendations on. <http://www.sheltervet.org/assets/docs/shelter-standards-oct2011-wforward.pdf>

OSHA *Chemical Hazard Communication Program*. This is an example of a Hazard Communication Program that can be used to help educate and train employees about how to stay safe around hazardous chemicals in the workplace.
https://www.osha.gov/dsg/hazcom/docs/State_of_Wisconsin_revised_Hazcom_Plan_2012.pdf

OSHA. *Personal Protective Equipment*. This document can be used to help employees and employers understand PPE requirements and proper selection of PPE.
<https://www.osha.gov/Publications/osha3151.pdf>

National Association of State Public Health Veterinarians. *Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel*. This document contains information about hand hygiene, PPE, environmental infection control, and how to write an infection control plan.

National Association of State Public Health Veterinarians. CDC, MMWR. *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings*. This document contains information about public health concerns associated with animals, including disease and injuries.

National Association of State Public Health Veterinarians. *Compendium of Animal Rabies Prevention and Control, 2016*. This document gives the most up-to-date recommendations for rabies prevention and control.

Shelter B

Shelter B is an open-admission municipal animal shelter located in Southern California. They accept and care for nearly 5,800 animals annually. This public health consult focused on assessing the shelter's attention to and practices of personal safety, animal-related injuries, and zoonoses.

Shelter Consultation Report

Date: July 2016

SHELTER B

Kansas State University
Kelly Voss

CONFIDENTIAL
Veterinary Client Information

CONSULTANT TEAM

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Lead Consultant: Kelly Voss

COVER LETTER

To Whom It May Concern:

This document contains information gathered from observations of public health practices at Shelter B during the summer of 2016. Strengths and concerns have been identified, and recommendations made on how to improve the shelter's public health practices. Useful resources have been included at the end of the report.

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I | Public Health

LEAD CONSULTANT: KELLY VOSS

According to the ASV Guidelines, animal shelters must take necessary precautions to protect public health and safety.

Observations and recommendations are divided into the following topics or subsections:

- Personal safety
- Animal related injuries
- Zoonotic disease

PERSONAL SAFETY

According to the ASV Guidelines, "Animal shelters must maintain compliance with federal and state occupational and safety regulations regarding chemical, biological, and physical hazards in the workplace."

Strengths Observed

- Staff and volunteers wore appropriate PPE during sanitation of animal housing units.** The shelter requires that gloves be worn. Masks are available but not necessarily offered. Gowns are available in isolation rooms, however sometimes volunteers or staff wear garbage bags with holes poked out for arms if gowns are not available. Ear plugs are offered. Staff consistently changed gloves after handling animals or animal waste.
- Wet floors were appropriately signed to warn about slipping hazards.** Floors in animal housing rooms are mopped after daily cleaning and warning signs are placed in a visible place to warn people of slippery floors.
- Animal housing areas were well ventilated during sanitation.** Fumes are noticeable during cleaning but central fans are turned on to keep airflow moving.

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- **Adequate number of sharps containers were available for sharps disposal.** Sharps containers were properly labeled with biohazard labels and were placed in animal intake areas, animal treatment areas, anesthesia areas, surgery preparation areas, and operating rooms.
 - **People do not eat or drink in animal housing areas.** Eating and drinking was only seen in designated employee break areas.

Concerns Identified

- **Proper personal protective equipment was not always worn by staff and volunteers during handling of chemicals.** The shelter uses accelerated hydrogen peroxide to sanitize the shelter. Staff members refill spray bottles as needed from a concentrated refill station. Staff members acknowledged that they could smell fumes from the refill station, however PPE was not observed to be worn during the refill process. There was an eye wash station right next to where all the chemicals are stored, but nobody was sure how to use it.
- **Hand washing and sanitizing stations are not available in the animal housing or handling areas.** There are two sinks in the shelter: one is accessible to the public and one is outside the shelter in a covered annex and is used for cleaning food bowls and litter boxes. There are several hand sanitizing stations scattered throughout the shelter, but none of these are within the animal housing areas so staff or visitors must leave the animal housing areas before sanitizing their hands. Employees and volunteers often opened doors with contaminated gloves when leaving animal housing areas. Sinks were available for hand washing in the bathrooms and staff break rooms.

Recommendations

- 1 | **Educate staff and volunteers of the chemical hazards in the workplace and enforce policy adherence.** Designate trained staff members to be responsible for diluting hazardous chemicals and educate them of procedures to follow in case of a chemical spill or accident.
- 2 | **Provide more hand washing stations throughout the shelter, especially in animal housing areas.** Proper hand hygiene is one of the most effective ways to protect personal safety in an animal shelter. Hands should be washed after contact with chemical or biological hazards, however people are less likely to comply with recommended hand sanitizing protocols if there are insufficient or inconveniently placed hand sanitizing stations. The Compendium of Veterinary Standard Precautions for Zoonotic Disease recommends hand washing stations (either sinks with running water, soap, and paper towels) or hand rub dispensers (containing at least 60% alcohol) be placed in every room where animals are housed or examined.

ANIMAL-RELATED INJURIES

According to the ASV Guidelines, animal shelters should provide policies, training, and equipment necessary to prevent and minimize risk of animal-related injuries.

Strengths Observed

- **Staff receives training on basic animal handling skills by an experienced animal handler.** Staff and volunteers are offered more classes throughout the year if they would like to gain more experience or refresh their skills.
- **Dangerous animals are sufficiently separated from parts of the shelter accessible to volunteers and the public.** Dangerous animals and rabies quarantined animals are housed in a locked room with restricted access via an electronic key fob. Only certain staff members are granted access to this room. Animal handling staff is trained to understand a color-coded system for identifying animals – cage cards with a blue sticker are animals that have been marked for euthanasia and are not to be handled. Animals with a “Q” on their cage card are on quarantine until the printed date. Fractious animals are only handled by trained field officers.
- **Sanitation of housing units for dogs and cats does not always require animal handling.** Guillotine type kennels for large dogs and divider slots for cat cages allow for sanitation of housing with little to animal handling. All dangerous animals are housed in a manner that does not require animal handling- guillotine-type cages for aggressive dogs and feral cat boxes for aggressive cats.
- **The shelter has a protocol for bites, scratches, and other animal-related injuries.** If someone is injured at the shelter, an injury report form must be filled out and given to the appropriate supervisor. The supervisor then decides if the injured person needs to seek medical attention and if any animals need to be quarantined.
- **The shelter understands the regulations for managing bites to humans and animals and follows written protocols for bite reports and quarantines.** Animal control officers reference the Laws and Regulations Relating to Rabies and Investigation, Management, and Prevention of Animal Bites in California, both of which are documents published by the California Department of Public Health.
- **The shelter vaccinates animals for rabies prior to adoption.** If an animal is adopted prior to 12 weeks of age, the shelter requires that the animal be vaccinated after adoption when it is old enough.

Concerns Identified

- **The quarantine ward is not properly signed.** While key access is required and individual animal cages are labeled, the ward still lacks a sign warning people of the inherent risks of handling these animals. Additionally, quarantined animals' paperwork lacks details for the reason for quarantine (bite, hold, sick, etc.).
- **Meet & greet areas are supervised by staff members only if another animal is being met.** Anytime the public is interacting with animals at the shelter, there is a risk of an animal-related injury. A staff member should be present to supervise these interactions to facilitate safe introductions.
- **Preparation for rabies submission is not always done by a vaccinated field officer.** Unvaccinated staff members prepared rabies samples, using gloves as the only personal protective equipment. The shelter receives an estimated 50-60 animal heads per year for rabies testing. The Advisory Committee in Immunization Practices advises that all people who routinely work with companion animals or wildlife receive pre-exposure vaccinations against rabies.

Recommendations

- 1 | **Post a sign on the quarantine ward that clearly warns people of the risks of handling these animals.** Details on the reason for quarantine should be written on each individual animal's paperwork.
- 2 | **Meet & greet areas should be supervised at all times by a staff member.** Anytime the public interacts with animals at the shelter, there is a risk of an animal-related injury. A staff member should be present to supervise these interactions to facilitate safe introductions.
- 3 | **Preparation of samples for rabies testing should exclusively be performed by trained, vaccinated staff members.** Rabies is a fatal disease and therefore extreme caution should be taken when preparing samples for testing. Full PPE should be worn and these high-risk activities should only be performed by vaccinated individuals. The most common reservoir for rabies in California is bats, so special precautions should be taken when handling live or dead bats brought to the shelter.

ZOONOTIC DISEASE

According to the ASV Guidelines, animal shelters are responsible for training staff about zoonotic conditions, protecting the public from diseased animals, and informing visitors, adopters, and foster-care providers of zoonotic disease risks.

Strengths Observed

- **Staff and volunteers receive some verbal information about zoonoses (i.e. Why do we wash our hands?) but not always depending on position within the shelter.** If there is a disease outbreak in the shelter, a staff meeting will be held where animal handling staff will be reminded to wear personal protective equipment.
- **If an animal had a zoonotic disease, it was typically housed in the technician room where it received treatment. Notes on the animal's paperwork indicated which disease the animal had and advised appropriate PPE that should be worn.** It is recommended to add the word "zoonotic" to the notes so staff members who are not aware of which diseases are zoonotic can remain informed and safe. The public does not have access to this room.
- **Animals are prophylactically dewormed upon intake.** Dogs and cats are administered Pyrantel pamoate during their intake exam, which controls for ascarids.

Concerns Identified

- **There is no written infection control document for the shelter.** The protocols for infection control were verbal only. For ringworm specifically, all cats are Wood's lamp examined upon intake. If a cat illuminates, it will be Lyme-sulfur dipped and moved to the x-ray room, where it is then euthanized. If the Wood's lamp examine is not conclusive, a trichogram is completed. If a cat has a URI, it will be moved to the URI isolation room. If a cat has something other than a URI, it will be moved to the "tech room" where it is treated. Recently MRSA was cultured from several kittens in the kitten nursery, which is located in a portable unit adjacent to the shelter. Specific handling instructions were given to staff members caring for those kittens, including gown and gloves. One of the MRSA infected kittens was moved into foster care.
- **Staff and volunteers do not receive enough training on how to respond to zoonotic disease exposure.** While they do receive some verbal information about zoonotic diseases, information about what to do in the event of a possible exposure are not communicated. Training should inform staff of how to respond when a zoonotic disease is suspected.

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- **There is a general lack of posted educational material warning staff, volunteers, and visitors of the potential of zoonotic disease transmission.** There are no zoonotic disease signs posted in the lobby, adoption stations, intake areas, housing areas, meet & greet areas, medical services area, or staff break room.
 - **Information about zoonotic diseases is not always given to visitors, foster homes, or adopters.** New foster parents are required to attend an informational presentation which does include some information regarding zoonoses.

Recommendations

- 1 | **Develop a written infection control protocol with special consideration given to zoonotic disease outbreaks.** Written guidelines of how to manage a zoonotic disease outbreak would help guide staff to take proper steps to ensuring the best infection control possible. While a verbal protocol is currently in place, written policies can increase consistency and adherence. Human safety should be the priority, and staff, volunteers, and the public should be adequately informed on how to protect their own health.
- 2 | **Implement a zoonotic disease training program for staff and volunteers.** In addition to the verbal information given to staff and volunteers about zoonotic diseases, an official training program should be in place to educate staff about prevention and management of zoonotic diseases in shelters. Educating staff and volunteers about zoonotic diseases can help decrease animal-to-human disease transmission as well as decrease severity of disease outbreaks by means of early detection. Training should include recognition of clinical signs, modes of transmission, and species affected.
- 3 | **Educational material should be posted throughout the shelter to educate staff, volunteers, and visitors about the risks of zoonotic diseases in animal shelters.** Signs should be posted near animal handling areas, such as the adoptions room and meet n' greet areas. Signs should include information about commonly transmitted zoonotic diseases in companion animals, precautions to take to prevent transmission of disease, and clinical signs to look for.
- 4 | **Information about zoonotic diseases should be provided to visitors, adopters, and foster parents.** Informational pamphlets should be readily available in the reception area of the shelter. New adopters and foster parents should be educated about zoonotic disease risks their animals may present to humans in the household.

ADDITIONAL RESOURCES

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https://www.osha.gov/dsg/hazcom/docs/State_of_Wisconsin_revised_Hazcom_Plan_2012.pdf

OSHA. *Personal Protective Equipment*. This document can be used to help employees and employers understand PPE requirements and proper selection of PPE.
<https://www.osha.gov/Publications/osha3151.pdf>

National Association of State Public Health Veterinarians. *Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel*. This document contains information about hand hygiene, PPE, environmental infection control, and how to write an infection control plan.

National Association of State Public Health Veterinarians. CDC, MMWR. *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings*. This document contains information about public health concerns associated with animals, including disease and injuries.

National Association of State Public Health Veterinarians. *Compendium of Animal Rabies Prevention and Control, 2016*. This document gives the most up-to-date recommendations for rabies prevention and control.

Chapter 5 - Conclusion

Animal shelters provide both benefits and risks to public health. Zoonotic diseases, animal-related injuries, and personal safety should be addressed when evaluating public health practices of an animal shelter. Some zoonotic diseases, such as ringworm, can become costly and time consuming to remove from a population of shelter animals and are best prevented by ensuring best public health practices. Mitigating risks to public health by improving public health practices within animal shelters serves to benefit the community.

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Appendix A - Ringworm Fact Sheet

RINGWORM FACT SHEET

WHAT IS RINGWORM?

- Ringworm (dermatophytosis) is a fungal infection affecting the skin, hair, and occasionally the nails of animals and people

WHY DO WE CARE ABOUT RINGWORM?

- Ringworm can be passed between dogs, cats and humans
- Individually ringworm is not very damaging, but since the fungus spreads so easily, even just one case can lead to an outbreak if the disease is not properly managed

WHO IS AT RISK OF GETTING RINGWORM?

- All mammals (including humans) are susceptible to ringworm, but certain groups have higher risk
- AGE: younger animals (< 1 year) and older animals are at higher risk
- SPECIES & BREED: Cats are at higher risk than dogs; long haired animals are at higher risk
- IMMUNE STATUS: animals with compromised immune systems are at higher risk (FIV, FeLV, pregnancy/lactation, malnutrition, stress)
- PREEXISTING CONDITIONS: animals with conditions that affect grooming (URI) or skin integrity (flea allergies, external parasites) are at higher risk

HOW IS RINGWORM SPREAD?

- Ringworm is spread via contact with an infected animal or contaminated environment
- In the outdoor environment, ringworm has been found in rodent nests and in soil
- Ringworm is very tough in the environment and can persist on surfaces for months or years
- Ringworm can be easily spread via contaminated toys, bedding, or by humans on clothes and hands
- The time it takes after exposure for clinical signs to develop is between 4 days and 4 weeks
- Ringworm can be found on the hair of animals from a contaminated environment even if the animal is not showing any signs

WHAT DOES RINGWORM LOOK LIKE?

- The most common clinical sign is a circular area of hair loss and scaling skin
- Most common locations for lesions are the face, ears, feet, tail, toenails
- The skin is often red, swollen, warm, itchy, or painful
- Animals with no apparent lesions could still have ringworm – use Wood’s lamp and cultures to confirm



WHAT SHOULD YOU DO IF YOUR ANIMALS HAVE RINGWORM?

- Identify all affected animals
- Segregate affected animals from general population
- Clean all surfaces that suspected ringworm animals have had contact with (floors, carriers, transport vehicles, countertops) with diluted bleach (1:32)
- Disinfect cages and all surfaces in contact with affected cats twice weekly with diluted bleach (1:32). Spot cleaning should be performed on a daily basis.

SAFETY PRECAUTIONS

- Wear personal protective equipment (PPE) when working with suspected or confirmed ringworm animals (long sleeve gown, gloves, shoe covers)
- Change gloves between touching animals and their environment (cage or kennel), and change gown if animal touches the gown (try to prevent contact if possible).
- Remove and discard PPE before leaving the quarantine area to reduce chances of ringworm spreading outside the quarantine area
- Do not mix cleaning agents with bleach – this could create a very dangerous gas

Figure 7. Ringworm fact sheet provided to shelter visitors in reception

Appendix B - How to be safe around ringworm

HOW TO BE SAFE AROUND RINGWORM

1. Always wear PPE (personal protective equipment) when handling ringworm cats and cleaning their cages – gloves, gown, booties over shoes
2. Change your gloves between EACH kennel
3. Do not touch cats between cages or between rooms without changing gloves
4. **CLEAN, CLEAN, AND CLEAN AGAIN!**
 - a. Wipe down all surfaces ringworm cats have had contact with – first with wet towel to get *hairs*, and then with BLEACH (1:32 dilution)
 - b. Let bleach sit for 10 minutes before wiping out cage again with wet towel
 - c. NEVER mix bleach with ammonia or acids (many cleaning agents contain ammonia and acids) – these mixtures will create dangerous toxic gases
5. Do not move cats between cages, unless new cats are found to be positive, and then they should be moved to the isolation room
6. Avoid touching your face or skin while wearing your gloves.
7. Remove your PPE and throw it away in the garbage INSIDE the isolation room.
8. Wash your hands before leaving the isolation room (or immediately after leaving if there is no sink)
9. Ringworm is easily transmitted if proper precautions are not taken – keep yourself and the animals protected.



Ringworm lesion on a human

Figure 8. Informational flyer posted on all isolation and quarantine rooms in the shelter

Appendix C - Zoonotic disease protocol

PROTOCOL FOR HANDLING ANIMALS SUSPECTED OF ZOOBOTIC DISEASE

INFECTION

1. Any animal suspected of having a zoonotic disease (see list below) should be identified upon admission. *If rabies is suspected, the animal should not be handled, and the animal control officer should be the sole person responsible for this animal until rabies quarantine is cleared.*
2. The suspected infectious animal(s) should be placed in isolation housing, separate from the general population of animals at the shelter.
3. Adequate signage should be placed on entry ways to the isolation room and on individual animal cages prohibiting unauthorized persons from entering. Only trained staff members should be authorized to enter the isolation room.
4. Proper personal protective equipment (PPE) must be worn when handling animals in isolation. PPE should be donned before entering the isolation room and removed and disposed of at the doorway immediately before leaving the isolation room.
 - a. Gloves
 - b. Disposable long-sleeved gown
 - c. Shoe covers
 - d. Facial protection
5. Any item in contact with suspected infectious animal should be considered contaminated and should be cleaned or disposed of only by authorized personnel wearing appropriate PPE. If possible all husbandry supplies for isolation animals should be cleaned and stored within the isolation room.
6. Hands should be washed immediately after removal of PPE.

Zoonotic diseases of concern in animal shelters include:

1. Bartonellosis
2. Brucellosis
3. Bubonic plague

4. Campylobacteriosis
5. Cutaneous larval migrans
6. Dermatophytosis
7. Giardiasis
8. Leptospirosis
9. Psittacosis
10. Rabies
11. Rickettsioses
12. Salmonellosis
13. Scabies
14. Toxocariasis
15. Toxoplasmosis

Appendix D - Bite and Scratch Protocol

PROTOCOL FOR DOG OR CAT BITE/SCRATCH TO STAFF MEMBER

*Use this protocol when any person is bitten by an animal while on shelter property
Adapted from Investigation, Management, and Prevention of Animal Bites in California
produced by the California Department of Public Health*

1. Initiate immediate first-aid treatment to the bite victim
 - a. Vigorously wash the bite wound with soap and water
 - b. Irrigate the wound with normal saline (especially important for deep puncture wounds)
2. If the bite is severe, deep, entails considerable tissue damage, or is to parts of the body more sensitive or susceptible to infection, the victim should immediately seek medical care
3. Keep the biting animal isolated and confined away from public access. Post signage on the animal's cage prohibiting handling of the animal until the incident is investigated by a qualified health officer.
4. Report the bite to the shelter manager, who will then report the bite to the animal control officer who will file a report to the local health officer
 - a. California regulation (17 California Code of Regulations [CCR] 2606 mandates that all bites from animals susceptible to rabies be reported to the local health officer
 - b. San Bernardino County health officer: Maxwell Ohikhuare, MD
 - i. (909) 387-6218
 - ii. mohikhuare@dph.sbcounty.gov
5. Animal bite investigation is initiated (local health officer may delegate to department of public health, city or county law enforcement, or municipal animal control)
 - a. Verify accuracy of initial report and collect additional information about the alleged bit incident
 - b. Determine the risk of rabies virus transmission
 - c. Identify measures to reduce or eliminate the potential for additional bite incidents

6. Follow instructions from local health officer for how to manage the biting animal (quarantine, vaccination, euthanasia, etc.)

If a person is **scratched (but not bitten): Initiate first-aid treatment and seek medical attention if the scratch is deep, entails considerable tissue damage, or is to parts of the body more sensitive or susceptible to infection. Per the CDPH, “Abrasions or scratches inflicted by the claws of an animal do not constitute a rabies exposure per se. Rabies transmission requires deposition of viable virus onto nerve endings which lie below the epidermis. Superficial scratches that do not penetrate the dermis and draw blood do not provide an avenue for rabies infection. Similarly, deep scratches for which subsequent deposition of fresh saliva can be ruled out do not represent possible rabies exposures. If injuries inflicted by an animal’s nails are deep or extensive, and subdermal contamination with saliva is likely, the potential for rabies transmission should be considered.”



- Healthy animals that bit a human are not to be euthanized during the quarantine period.
- Sick or injured animals that are euthanized during the quarantine period due to humane reasons must be tested for rabies.
- If a pet bit a human and was not up to date on the rabies vaccine at the time of the bite, do NOT vaccinate the pet until after the quarantine period.
- Report all neurologic animals suspected for being rabid to VPH at (213) 989-7060

Figure 9. Animal bite quarantine flow chart from the Los Angeles Public Health Department