Operational Guide

Sanitation and Disease Control in the Shelter Environment

AMERICAN HUMANE

Protecting Children & Animals Since 1877

About the Author

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Introduction

The humane operation of an animal shelter requires that it be a healthful and sanitary environment. Prevention of disease is typically easier and more cost effective than addressing an outbreak. Poor sanitation and insufficient preventive health programs lead to unnecessary suffering through needless disease and increased rates of euthanasia. The unhealthful shelter also risks developing a poor reputation in the community, reducing adoption rates and driving away potential adopters, volunteers and donors.

The added risk of introducing zoonotic disease into the community is of particular concern. Not only is this irresponsible, but it can be devastating to the shelter if serious illness and litigation ensues.

With new animals constantly being brought in, sanitation and disease control are an ongoing challenge, requiring constant effort and vigilance. These daily arrivals bring with them potentially unknown disease conditions and an unknown immune status. The stress of a change in environment — from home to street to an institutional kennel — can lower immune system response, causing previously asymptomatic animals to break out with disease. Some apparently healthy animals may be a Trojan horse, carrying in disease without ever expressing symptoms themselves.

In addition, shelters face other challenges, such as aging or inappropriately designed facilities, overworked staff leading to high turnover, excessive numbers of animals and budget constraints. All shelters do not face the same challenges. There are differences in philosophy and mandate which dictate different approaches to management of disease outbreaks or population control within the facility. A municipal shelter charged with caring for all stray dogs in the community faces different challenges than the limited-admission cat sanctuary. The most modern and well-designed shelter with an untrained or uncaring staff will be a sicker and less humane place than an aging building with a staff that understands disease transmission, its relationship to cleanliness and the importance of working hard to maintain high standards.

Therefore, the common thread for all animal care and control facilities is the reduction of disease transmission through:

- Proper cleaning and disinfection protocols
- Appropriate animal handling
- Good preventive medicine
- Consistent staff training
- Effective stress reduction for the animals (and humans) involved

Given the nature of sheltering work, disease outbreaks may never be eradicated, but the sooner staff notice disease symptoms and take action to isolate sick animals, the less severe the outbreak will be. (Depending on an individual facility's approach, solutions may range from isolation of the sick animal to the use of foster homes or euthanasia.

Holding and Separation Areas

Holding Areas

When they first arrive, place new animals in a holding area for the short term only — ideally, less than two hours, but no more than one day. This allows for triage of the animal and assessment of its health needs.

A veterinarian or trained animal care staff member should examine the animal for injuries or signs of suffering (pain, difficulty breathing, or abnormal or difficult labor, for example). If an animal exhibits immediate, gross outward signs of disease, move it to isolation.

Otherwise, allow the animal to settle into the holding area for an hour or so. This facilitates examination, allows the body temperature to normalize from the stress of transport and facilitates vaccine administration.

Regardless of source, scan the animal for a microchip and look for identifying tattoos. Administer initial core vaccinations and complete an initial health screening at this time (FeLV/FIV or heartworm testing, for example). Administer routine dewormers as well. This is also the best time to determine if the animal has been spayed or neutered by checking for testicles or looking for evidence of a spay scar.

If the animal appears healthy but has an unknown health history, move it to quarantine. If it has a known health history, such as being surrendered with veterinary records indicating proper care and vaccination, move the animal into a healthy holding area.

If an animal is exhibiting signs of illness or aggression, staff may make a euthanasia decision.

The early elimination of the obviously sick, the poorly conditioned and the vulnerable animal will raise the overall health level of the facility. The very stressed are the most vulnerable to disease. Depending on space limitations or shelter protocols, the nervous or flighty animal may be selected for euthanasia at this early juncture. Check state and local laws for mandated hold periods on stray animals before euthanizing.

Quarantine

Quarantine areas hold new admissions that are being monitored for the possible development of disease. Depending on the prevalent diseases and available resources, quarantine may be as short as two days or as long as six months if required by law for rabies observation in cases of bite wounds of unknown origin.

Ideally, staff should observe animals with unknown histories for approximately one week prior to moving them to adoption areas. This allows time for expression of disease symptoms or for administered vaccines to become protective. This is not realistic for most shelters, so active disease control is imperative.

Isolation

Isolation wards hold clearly sick animals for observation and treatment away from the rest of the shelter population, thereby protecting other animals from disease transmission. The ideal isolation area is in a separate building, with showering facilities and changing rooms for the staff.

Staff should care for isolation animals at the end of the work shift or shower and change before moving on to other animals.

A properly designed isolation ward will have negative pressure airflow so that air circulates out of isolation to the outside, rather than re-circulating into the remainder of the shelter.

The best isolation principles include the use of disposable gowns, gloves and booties, and bleach foot baths. Never take equipment used in isolation elsewhere in the shelter. Drainage should never flow from isolation into healthy holding areas.

Euthanasia

Euthanasia is the ultimate isolation or quarantine effort. This is the permanent removal of animals from the population, either because they express disease and risk to the remainder of the population or because they are uniquely vulnerable to disease due to stress, nutritional status or age.

When shelter population numbers reach the facility's threshold, difficult decisions are sometimes made. In these cases, staff examines the population for the riskiest individuals. Once a decision is made, carry out the euthanasia in a timely manner.

Adoption

In the adoption area, the public views and visits with animals up for adoption. It's the best place to be. Think of it this way — the adoption area is the closest to freedom; the isolation area is the closest to euthanasia.

Once an animal crosses the hurdles of evaluation and onto the adoption floor, it is significantly less likely to slide back into isolation or euthanasia. The more quickly animals can be moved through evaluation for health and behavior, the more quickly they get to the adoption floor and out of the building into a new home. Short turnover times mean decreased illnesses and increased adoptions.

Group Housing

Group housing is one option for an adoption area, or long-term holding area if necessary for the duration of a law enforcement case. Cats may be housed in colonies, and dogs may be pair housed. These arrangements alleviate stress and boredom when appropriate social matching is done.

Cat Colonies

Before being selected for group housing, vaccinate cats with core vaccines, test them for FeLV/FIV, prophylactically deworm them and treat them with a topical mitacide (flea and tick preventive). Perform a fecal analysis of each cat as well, then tailor deworming if any internal parasites are found. Staff may also perform toothbrush cultures for the presence of ringworm spores since there are many more carrier cats than there are symptomatic cases.

Form groups no larger than 10 cats or 15 kittens. Arrange the groups by age, where kittens under 3 months cohabitate, then groups of 3 to 6 months, 6 months to 5 years, and another group for the more mature, sedentary cats. The ideal colony consists of only spayed and neutered cats. Observe the colony for compatibility at the outset. Remove any members who consistently bully or cower and those who overeat or refuse to eat. Because monitoring of individual cats is difficult, weigh and briefly examine each cat weekly to look for changes.

In each feline group-housing area, allow a minimum of 10 square feet per cat. Provide perches of various heights, hide

boxes, multiple litter boxes, and multiple food and water stations.

Spot clean the provided litter boxes (three or four) throughout the day, then completely change them over and clean them once a day. If staff finds feces and urine outside the boxes, more may be needed.

Most shelters choose to build a colony of 10 or less compatible cats and introduce no new cats until the last cat has been adopted. Maintain and spot clean the colony during its run. Once the last cat is adopted, strip the room and completely clean and disinfect it.

If new cats are constantly introduced, the room must be disinfected daily, and the cats must be monitored closely for signs of infectious diseases, especially sneezing and diarrhea.

Disease Transmission via Foot Traffic

Diseases are most often carried and transmitted by fomite. A fomite is any inanimate object capable of transferring an infectious agent from one place to another. When we have an enterovirus (any virus affecting the gastrointestinal tract marked by vomiting and/or diarrhea) outbreak, the most common fomite is the shoe. With upper respiratory agents, the most common fomite is the hand.

Towels or rags, litter pans, toys, food dishes, clothing, mops and cleaning carts can all act as fomites. For this reason, it is critical to establish cleaning protocols so that the areas with the healthiest animals are cleaned before the areas with animals of unknown health status (recent arrivals). Always clean areas where the sick animals are housed last.

Staff that clean isolation areas with sick animals should either gown up or have a complete change of clothing before working with other populations.

Only allow public access to areas that house healthy animals.

Use foot baths where enterovirus outbreaks are suspected. Trifectant or another quaternary agent is recommended for foot baths. Bleach is not appropriate for foot baths because it is quickly deactivated by contaminants. Change the bath daily or sooner if the bath is visibly contaminated with dirt or debris. Make disposable gloves and wall-mounted hand-sanitizer units readily available in many locations.

Note: If using fans to blow air through the facility, always direct airflow from the healthy toward the sick.

Kennel Design and Layout

Floors and Walls

The ideal kennel enclosure is non-porous and scratchproof. Epoxy-sealed concrete floors, with caulked cracks, are the best choice for shelter flooring. Treat concrete-block walls with impervious epoxy paint as well. Wood, jute, carpet and plastic flooring can never be adequately sanitized; therefore, they should not be used. Older facilities that still have such flooring must discard it when there is any incidence of disease outbreak.

Sound Control

Constant noise is stressful for people and animals. If possible, pipe in soft classical music to provide soothing, ambient noise. Otherwise, shelter sound-mitigation choices include appropriate ceiling tiles and baffles or blankets/tapestries hung on the walls to reduce noise. Launder any blankets/tapestries regularly because they trap dust and free-floating fur.

Odor Control

Avoid deodorant sprays or air fresheners, which only mask odors. The sources of masked odors are harder to find, which means the odor-causing condition will become worse before its source is identified. This includes odors from inadequate sanitation, garbage, feces, infections or mildew. Once identified, eradicate the odor's root cause. Clean, healthy shelters have a neutral odor, rather than an offensive or perfumed odor.

Layout

As much as possible, arrange kennels so that dogs do not face one another.

HVAC Systems

Ventilation and the number of air exchanges play a key role in preventing the spread of contagious diseases. Ideally, shelters should have a separate ventilation system for each animal-housing area. At a minimum, there should be a separate system for each isolation area. A minimum air exchange rate of 10 to 12 per hour is recommended in animal-***housing areas.***

Food Storage and Pest Control

Store food in insect- and rodent-proof containers to minimize contamination and disease outbreaks. Flies can transport parvo virus, and rodents may shed disease-causing organisms in their feces. Select any necessary pest-control products carefully since shelter animals may be directly or indirectly exposed.

Sanitation, Cleaning and Disinfection

Cleaning Process

Sanitation is not sterilization, which is a complete removal of all infectious organisms. That ideal is impossible to achieve in the shelter setting. Instead, sanitation is the process of cleaning the kennel environment to effectively reduce the presence of infectious organisms. The goal is to reduce the number of infectious organisms to below the disease-transmission threshold.

Sanitation is achieved through a four step process:

1. Dry cleaning
2. Wet cleaning with a detergent
3. Wet cleaning with a disinfectant
4. Weekly degreasing

Some older sanitation protocols refer to a two-step process: physical cleaning followed by chemical cleaning. However, chemical cleaning involves two steps, scrubbing with detergent followed by disinfection, which itself takes considerable physical effort.

Once a sanitation protocol is devised, train all employees on the proper implementation of the protocol, with a special emphasis on thorough cleaning and personal protective equipment. For example, all personnel should wear protective clothing and rubber boots during sanitation work, including scrubbing and disinfecting boots for each run before moving on to the next. Safety glasses and face masks prevent staff from being exposed to airborne particles, such as chemicals and pathogens. Animal handlers must also remember to wash their hands or change gloves between animals.

Explain the goals, methods and reasons for your sanitation protocol completely. Post signs that remind employees of the step-by-step protocol.

Sanitation requires removal of the animal from the area to be cleaned. It is never appropriate, nor is it humane, to use a hose or apply disinfectants in an enclosure with an animal still present.

Generally, cat cages and cat colony rooms should be spot cleaned only on a daily basis without removing the cats. This process consists of removing and replacing any soiled bedding, providing fresh food and water, and thoroughly cleaning or replacing the litter box. Cages should be completely cleaned and sanitized when the cat leaves. Colony rooms should be completely cleaned and sanitized weekly.

Dogs should be moved to one side of a guillotine door, if there are indoor/outdoor runs or divided indoor/indoor runs. As an alternative, have a volunteer or staff member take the dogs for a walk during cleaning.

If these options are not viable, some shelters keep an empty run at all times. Ideally, each shelter environment an animal uses (i.e., run, cage) only houses that animal during its stay. Since that may not be possible, be sure to thoroughly disinfect temporary holding areas between uses by different animals.

One dog at a time is removed from its soiled run or cage and placed in the clean, empty run or cage, and then he is returned to his clean run. It is best to return animals to the same run or cage after cleaning. This is the least stressful and safest alternative because each animal returns to its own germ environment. (Remember,

even the best sanitation program drastically reduces, but does not eliminate, infective organisms.)

One habit that frequently develops among under-supervised volunteers or staff is to allow animals, especially cats, to wander while their enclosures are cleaned. Shelter management should strongly discourage this practice to prevent pooling of pathogens.

Once the animal is removed, the next step is the so-called "dry cleaning step," where staff removes everything from the cage or run, including, papers, litter box, toys, towels or blankets and food dishes.

Disinfect all of these items on a daily basis, or use disposable substitutes. Many shelters use restaurant suppliers for paper dishes or trays for litter boxes. A possible free supply may be found through your local soft drink distributor or grocery store. You may be able to convince them to save cardboard case bottoms to use as litter boxes or snuggle boxes for cats. If you do not choose to use disposable dishes and litter boxes for cats, then stainless-steel items are recommended. You can purchase stainless-steel pans from a restaurant supplier in a variety of sizes than can be used as litter pans. They are more expensive to purchase initially than plastic pans, but they will last indefinitely and can be easily cleaned and sanitized. Plastic bowls and litter pans are porous and become easily scratched, which makes them impossible to disinfect.

Ideally, stainless-steel dishes and litter pans should be run through an industrial dishwasher. The high temperature combined with the dishwasher detergent is a very effective method of disinfecting these items. If you do not have a dishwasher, then place empty dishes and litter boxes in a tub or a sink to soak in a detergent solution.

Soiled towels and bedding should be washed in a washing machine, preferably in hot water in regular laundry detergent. You can also add bleach to the laundry, but it is generally not necessary.

For reusable litter boxes, carefully lower them into the trash barrel and empty gently to avoid the dispersal of dust into the air. Carefully scoop and place in the trash all solid or semi-solid waste.

Wipe any trace material from the run or cage (e.g., litter, food, vomit, saliva, sneeze splatter marks, urine or fecal residue) with moist paper towels.

The goal is to remove as much organic material as possible. Feces cannot be disinfected. Parvoviruses can last six to 12 months or more in debris. Disinfectants only destroy a percentage of bacteria and viruses, and the smaller the population on the surface, the fewer will be left at the end of sanitation. Organic material also directly inactivates many disinfectants, and no disinfectant can penetrate organic material. Once the kennel appears "clean" to the eye, it is time to begin "wet cleaning."

Wet cleaning begins by applying a cleaner with a detergent component. Washing is the most crucial step of the disinfecting process and is best accomplished with hot water and detergent. Washing further reduces the number of microorganisms present so that the next step, disinfection, will be most effective. Efficient cleaning with detergent removes up to 99 percent of bacteria present.

In kennels with drains or a runoff system, detergent is most effectively applied with a low-pressure foamer, a device placed at the end of a hose to dilute the detergent to the appropriate ratio. This method ensures the even and thorough application of the cleaner. Foaming also provides clinging ability for vertical and hard-to-reach surfaces, and enhances product performance. For cages, apply detergent with squeeze bottles and paper towels. Avoid buckets and rags because they can be a primary conduit for transmitting disease.

Next, scrub all surfaces with a stiff brush to ensure penetration and breakdown of accumulated materials. Scrub from cleanest area to dirtiest, which usually means from top to bottom. Pay special attention to cracks, corners, cage bars and shelf lips, where debris can accumulate. Do not neglect the guillotine doors or other surfaces in the enclosure.

Rinse and disinfect the brush (a 10-minute soak) between runs. For efficiency, disinfect one or two brushes while using another so that you can rotate between several brushes to ensure that a disinfected one is used at the outset of each run or cage.

Once the entire surface has been vigorously scrubbed, rinse away all detergent material with a low-pressure hose. High-pressure systems create splatter and aerosols, which can carry infective agents into the air. Because they are not yet disinfected, the detergent solution and suspended bacteria and viruses can potentially transmit disease.

Prior to application of the next step — the disinfectant — remove excess moisture with paper towels (for cages) or a squeegee (for runs). Then properly dilute and apply the disinfectant solution. Always measure and mix chemicals. Looking for color concentration leads to wasted product and money. It can be potentially toxic as well, if the solution is too concentrated.

Read the manufacturer's labeling completely and use the product within the specified guidelines. The Occupational Safety and Health Administration (OSHA) publishes guidelines and regulations for chemical uses. It helps to know that terms ending in "cidal" mean the chemical will kill the indicated organism, whereas "static" only indicates control or suppression of growth.

Disinfectants should never be mixed because lethal combinations may result. Misuse of a chemical violates Environmental Protection Agency (EPA) regulations.

Disinfectants work best at room temperature (68° F). Cold water, along with the presence of any organic material, diminishes the disinfection activity. Some disinfectants, such as bleach, must be mixed fresh each day as the effectiveness deteriorates with time. Other disinfectants, such as Trifectant, are stable for a week or more after they are mixed.

For cage disinfectants, use squeeze bottles that emit a gentle stream rather than spray bottles that mist, because disinfectants can be a significant respiratory irritant to both employees and animals. For larger areas such as runs, a foamer is the best choice for diluting the disinfectant. A backpack-type pressurized garden sprayer is also an effective distribution tool.

Once applied, disinfectants must be allowed to contact surfaces for the appropriate length of time in order to be effective. For most disinfectants, a minimum of 10 minutes is recommended.

A chemical degreaser should be used on all cage and run surfaces weekly or whenever an animal leaves an enclosure permanently. Degreasers break down the biofilm that prevents penetration of disinfectants. Biofilm includes the accumulation of oils from the skin of animals and other moisture that supports bacterial growth. Biofilm feels slick or slimy to the touch when wet. Bacteria secrete a protective film, which also prevents complete penetration of a disinfecting agent. If this film is not broken down and washed away, it traps dust, shed skin cells and other materials. This layer becomes a rich habitat to support growth of algae, fungus and disease-causing organisms. The degreaser should be applied after the detergent is rinsed away and before the disinfectant is applied. Degreaser should be applied either with a foamer or squirt bottle, and the surface should be scrubbed using a stiff-bristled brush. The degreaser alone will not remove the biofilm without some scrubbing. The degreaser should be thoroughly rinsed away before the disinfectant is applied.

Drains should be cleaned of accumulated hair, food matter and feces daily, and disinfected along with the kennel surfaces. After cleaning cages and kennels, clean and disinfect common floor areas and counter surfaces. Where possible, use a fresh damp mop rather than brooms and vacuums, which put dust and hair into the air. Centralized vacuuming, if available, is also a good choice.

Clean and disinfect the cleaning equipment itself. This includes the hoses that may have been dragged through contaminated areas. As with all traffic patterns, it is always best to drag the hose on a clean-to-dirty path, whenever possible.

Remember, especially in times of disease outbreak, that the entire facility may be contaminated. Doorknobs, keyboards, telephones, grooming tools, medical equipment, vehicles, transport cages, traps, leashes, snares, poop scoopers, mop handles, ducts and vents, walls and floors of even non-animal areas, and storage areas require special attention after an outbreak.

Common outdoor areas can never be completely disinfected. The best disease-prevention program includes a vigilant outdoor poop-scooping effort. If feces are collected as soon as they are produced, there is no time for parasite eggs to sporulate and become infective, and there is no time for viruses to disperse. Dogs with diarrhea should be limited to a gravel walk that is then thoroughly hosed down and sprayed directly with full-strength bleach in the area of elimination. (Remember, parvovirus and panleukopenia viruses experience an upswing in times of wet weather.)

Types of Disinfectants

There are several disinfectant types to choose from. Microorganisms vary in their degree of susceptibility to disinfectants. In general, Gram-positive bacteria are more susceptible to chemical disinfectants, while mycobacteria or bacterial endospores are more resistant. The hydrophilic, non-enveloped viruses (such as adenoviruses, picornaviruses, reoviruses and rotaviruses) are more resistant to

disinfection than lipophilic, enveloped viruses (such as coronaviruses, herpesviruses, orthomyxoviruses, paramyxoviruses and retroviruses).

Pathogenic organisms also vary in their ability to survive or persist in environments (such as bedding, debris or feed) and in their potential routes of transmission. Whenever possible and especially in times of disease outbreak, work hard to identify the target organism. However, if the organism has not been identified, use a broad-spectrum approach until identification can be made.

There is no perfect disinfectant, so shelters must carefully consider their individual needs to tailor their disinfectant choice to the most useful, cost-efficient and effective type possible.

Bleach

Bleach is the most cost-effective disinfectant. At a 1:32 dilution ratio (0.5 cup of bleach to 1 gallon of water), it kills bacteria, parvovirus, panleukopenia and respiratory viruses. At a stronger concentration, 1:10 (1.5 cups bleach to 1 gallon of water), bleach kills ringworm spores.

Make sure to remove any organic waste first, as bleach is inactivated by organic material. Bleach should have at least 10 minutes of contact time before rinsing.

The drawbacks to bleach include its corrosive qualities, destruction of clothing and other fabrics, and the respiratory irritant factor. It also has a limited shelf life after it is opened and loses its power rapidly. However, nothing beats bleach in the face of a disease outbreak.

Do not mix bleach with Quat products.

Quats

Quaternary ammonium compounds (Quats) are another commonly used shelter disinfectant. Brand names include Roccal, Parvosol and Kennel-Sol. Quats differ in the presence or absence of detergents, perfumes and dyes. Highly effective against Gram-positive bacteria, quats also have good efficacy against Gram-negative bacteria, fungi and enveloped viruses. Some are not effective against non-enveloped viruses like parvo and panleukopenia or mycobacteria. Quats are considered sporostatic but not sporocidal. Most quats are only partially effective against calici viruses.

The pH or hardness of water may impact the effectiveness of a quat solution. There are various generations of quaternary ammonium compounds, some of which kill parvo and panleukopenia viruses under laboratory conditions, but they are less than effective in the shelter setting.

Avoid combination products with detergent and disinfecting quats because cleaning should always come prior to disinfection.

Oxidizing Agents

The brand names of oxidizing agents include Virkon-S and Trifectant. Oxidizing agents are effective against panleukopenia and feline calici virus. Studies also support efficacy against other unenveloped viral agents, including parvo. They are labeled as effective against ringworm, although recent reports have not borne that out. Reportedly less corrosive to metal than bleach, oxidizers have moderate activity in the presence of organic matter.

One drawback is that the chemical comes in powdered form that can be messy to

handle and mix, including clumping and caking, and a visible dusty residue sometimes remains on surfaces.

On the positive side, the mixed solution remains stable for up to seven days. Oxidizers feature colored additives that fade with the effectiveness of the cleaner, so the solution can be visually inspected to see if it is still good. These agents may be used on fabrics and carpets. They may be a good choice for disinfecting carpets and upholstery, particularly in a contaminated foster home environment.

Biguanides

Brand names include Novalsan and Chlorhexidine. These products have a narrow range of action and are expensive. Most effective against bacteria, they are often used on the skin prior to surgery rather than as a routine kennel disinfectant.

Phenols

Phenols, like Lysol and Pine-Sol, are bacteriocidal, fungicidal and virucidal to most viruses with the exception of the unenveloped viruses (such as parvo and panleukopenia). The presence of organic material reduces their effectiveness, but less so than other disinfectants. Phenols can be recognized by their tendency to turn milky white when added to water. Phenols have a residual disinfecting effect that can be beneficial.

Phenols Toxicity

Phenols are highly toxic to cats, and in strong concentrations (2 percent or higher), phenols are toxic to all animals, including humans. For these reasons, phenols should never be used in animal-holding areas (kennels and cages) and should be used with caution elsewhere.

Some shelters use phenols on the floors of common areas with a high level of human foot traffic. Other shelters do not want the risk of having phenols on the shelf anywhere in the shelter where they could be accidentally used by a well-meaning volunteer or new staff member.

Disinfectant Use and Safety

Disinfectants must be left in contact with the surface for the period specified by the manufacturer (usually 10 minutes) and in ample volume to avoid drying before the contact time is completed. Some disinfectant residues must be rinsed away, but most will be safe if completely air dried before returning the animal to the environment. Air drying may be hastened by the use of a squeegee or paper towels.

Fans may be used with some caution. Avoid fans where they will blow respiratory irritant fumes around the shelter or where they force air from one area of the shelter to another.

Telltale signs of animals being exposed to wet disinfectants or concentrated residues are sores around the mouth, on or in between the foot pads, or on the scrotum.

Disinfectants should be carefully stored and capped tightly to reduce evaporation and absorption of moisture from the air. Depending on the use rate of disinfectants in a particular facility, it may be more effective to buy slightly more expensive smaller containers rather than a 50-gallon drum, which sits around long enough to deteriorate and lose effectiveness.

Protective eyeglasses or goggles, chemical-resistant gloves, respirators, boots and protective clothing must be readily available, particularly when mixing

and handling undiluted disinfectants. Set up and regularly maintain emergency eyewash stations in each area. Do not store chemicals in the same area as food or bedding.

OSHA requires that a library of Material Safety Data Sheets (MSDSs) for every chemical used in the shelter be available in a central location. All chemical disinfectants must have a MSDS listing the stability, hazards and personal protection needed, as well as first aid information. Train staff in the use of MSDSs in case of accidental exposure. MSDSs are available from your chemical supplier or may be available through your distributor's website.

Disease Recognition

Viral Diseases

Canine Parvovirus

Parvovirus is a non-enveloped virus that is very durable in the environment and resistant to many disinfectants. Bleach diluted to 1:32 in an environment free of organic matter will kill parvovirus.

The young are the most vulnerable, but older dogs may develop a transient infection without clinical signs. Parvovirus attacks and kills rapidly dividing cells. As it destroys the intestinal lining, parvo causes vomiting and diarrhea. It also attacks bone marrow, lowering the immune system to almost nothing. Animals die from dehydration, protein loss and secondary infection. **In a young dog without treatment, parvo is 100 percent fatal.**

The incubation period runs three days to two weeks, although the usual period is five to seven days. After recovery, parvo-infected dogs may continue to shed virus in their feces for up to one month. It is possible but not common for cats to be infected with canine parvovirus.

There is a fecal viral antigen test (Idexx SNAP) that is very accurate at detecting antigen. Beware of the false positive in the recently vaccinated dog. The false positive will be a faint blue spot. A deep blue positive spot is always indicative of parvovirus infection. A negative test is not always truly negative. A blood smear to look for the presence of white blood cells may also be done.

The treatment of parvo requires stringent isolation techniques, intravenous fluids, powerful antibiotics and intravenous protein supplementation. This level of nursing care must be done in a veterinary clinic. Most dogs require between three days and three weeks of intensive care.

Because a recovered dog is a contamination risk and the treatment is costly, most shelters euthanize parvo dogs.

Canine Coronavirus

Canine coronavirus is a self-limiting viral enteric disease of dogs that causes vomiting and diarrhea. The incubation period is one to five days. It is spread through contact with infected feces. Dehydration is more serious and can be life threatening in puppies. Dogs will do well with supportive care, fluids and antibiotics. Dogs will shed corona virus for one to two weeks post infection. It is susceptible to most disinfectants.

Canine Distemper

Canine distemper is caused by an enveloped, and more easily disinfected, virus. Ferrets and raccoons are also susceptible to canine distemper.

The virus is most often spread by aerosol droplets produced through a cough or sneeze. The incubation period is one to two weeks, and onset of the disease is marked by lethargy, fever, anorexia and nasal discharge, followed by pneumonia or gastrointestinal signs.

Neurological signs, such as muscle twitches, seizures and behavior changes, may develop one to three weeks later. The dog with distemper may have ocular involvement. Watch for hardening of the footpads and nose pad, which are associated with a poor outcome. These dogs are more likely to suffer lifelong neurological effects.

Preventive vaccination is very effective, but shelter staff must suspect distemper in any dog with a nasal discharge and fever.

Canine Parainfluenza

This virus is one of the components of the Kennel Cough Complex. Parainfluenza invades the lining of the upper respiratory tract. On its own, Parainfluenza causes a mild disease. This virus incubates for five to 10 days. Not hardy in the environment, parainfluenza is easily disinfected.

This disease becomes complicated when a secondary bacterial component joins in, the most common of which is bordatella bronchiseptica (see below).

Canine Adenovirus Type 2 (CAV2)

Another viral component of kennel cough, CAV2 is transmitted by aerosol, but it is also not hardy in the environment. CAV2 incubates for five to 10 days and causes mild disease on its own.

Infectious Canine Hepatitis (Canine Adenovirus Type 1)

This infection is marked by a fever over 104 F, watery eye discharge, lethargy, abdominal pain and swelling. This infection can be serious and require hospitalization. Some dogs require blood transfusions for low white blood-cell counts and low platelet counts. The virus is somewhat hardy in the environment, and recovered dogs can shed virus for up to six months. Vaccination is an effective preventive.

This virus often causes loss of litters of puppies, even puppies of apparently healthy bitches. She may have had CAV2, recovered and is shedding virus when her pups are delivered. The puppies will die one by one in what is referred to as "fading puppy syndrome."

Rabies

This fatal virus is transmitted by the saliva of an infected animal through a bite wound. The most often-implicated carriers are bats, skunks, foxes and other wildlife. This virus travels from the site of the bite wound to the brain via the nervous system. By the time the virus is detectable in brain tissue, it is also being shed by the salivary glands. All bite wounds of unknown origin must be treated as rabies suspects.

State laws are very detailed and specific regarding vaccination use and the management of rabies-suspected animals. Consider the possibility of rabies in any mammal with neurological signs. Rabies can incubate for as long as five months before reaching the brain.

Feline Upper Respiratory Disease Complex (URI)

Feline URI can be caused by the feline herpes virus, calici virus, Chlamydophila felis (formerly known as Chlamydia psittici), mycoplasma and occasionally bordatella bronchiseptica, or any combination of the above viral and bacterial organisms. Often, the exact causative agents are not clear, but appropriate therapy is supportive with oral and ophthalmic antibiotics that will be effective against C. felis, mycoplasma and bordatella when secondary bacterial infection is suspected. The viral component has to run its course, and like the human common cold, can take up to three weeks to do so.

Feline Herpes Virus (Feline Viral Rhinotracheitis – FVR)

Most cats have been exposed to FVR at some point in their lives. Like all herpes viruses, it never completely clears and can re-emerge at times of stress. When it is being shed in oral, ocular and nasal

secretions, the virus is highly contagious. This virus is often transmitted by fomite and can live up to four hours on inanimate objects.

Cats with herpes viral infections will have sneezing, ocular and nasal discharge, fever and lethargy. The use of lysine oral supplementation has been shown to shorten the duration of the disease. Kittens should receive 250 mg and cats 500 mg once a day. This nutritional supplement may be obtained in powdered form and sprinkled on food. More severe cases may require fluids and force feeding.

Feline Calici Virus

Like herpes virus, calici can be shed chronically by carrier cats in times of stress. Calici virus is considerably hardier in the environment than herpes virus and requires bleach disinfection. Calici virus is also fomite transmitted and can live up to 28 days on inanimate objects.

Calici virus produces symptoms similar to herpes virus, but also can cause significant drooling due to large, painful oral ulcers. In kittens, calici virus can cause arthritis and sudden death from acute pneumonia.

There have been outbreaks of Virulent Systemic Feline Calici virus (VS-FCV), formerly known as hemorrhagic calici virus, throughout the United States. This form of the virus, although rare, is resistant to vaccination, can be shed by unaffected carriers and has a high mortality rate. VS-FCV should be suspected if cats are dying of upper respiratory infection in the shelter.

Feline Panleukopenia

This non-enveloped virus is closely related to the canine parvovirus and causes the same disease course. This disease has been called “feline distemper” in the past, which is confusing. Feline parvo would be more accurate. This disease causes vomiting, diarrhea, lethargy, anorexia and bone marrow suppression. Sometimes the only symptom in the early course of disease is profuse hypersalivation.

The Idexx SNAP parvo antigen test cross reacts with panleukopenia. This test should be conducted on any panleuk-suspect cat, particularly in times of increased disease outbreaks (the spring and fall). Panleuk incubates for three to seven days and causes varying degrees of illness, depending on the virulence or strength of the virus, and the immune status of the cat or kitten affected. As with canine parvovirus, some cats can be shedding the virus without showing any symptoms. It is also persistent in the environment and resistant to most chemical disinfection.

Vaccination is effective prevention. Modified live, single-agent vaccines are available and are recommended on admission to provide the most rapid immunity among shelter cats. **Do not give modified live vaccinations to pregnant cats.**

Feline Leukemia Virus (FeLV)

This retrovirus is moderately contagious and requires cat-to-cat contact. FeLV may be transmitted vertically from queen to kittens. This virus may be transmitted through friendly behavior, such as allogrooming or sharing common food bowls. This virus can survive up to two days in a moist environment.

Feline leukemia is a biphasic disease. It can become symptomatic early in a kitten’s life, causing bone marrow suppression, susceptibility to other

diseases and death. If an infected cat survives this period, it may go on to have a long, healthy life marked by bone marrow suppression or the development of cancer in its teen years.

Feline Infectious Peritonitis (FIP)

FIP is caused by a corona virus in cats similar to the corona virus in dogs described above. Most cats exposed to corona virus will have a mild, self-limiting case of vomiting and diarrhea, which resolves with no residual effect.

In certain situations with susceptible populations, usually purebred cats, corona virus can mutate to a form that causes fatal disease. These cases are marked by fluid accumulation in the belly or by granulomatous disease causing inflammation of the eyes or brain (seizures). Kittens may show symptoms of failure to thrive or grow, with intermittent fevers.

Corona vaccination is not effective. Good husbandry is the best preventive as the virus is not hardy in the environment.

Bacterial Diseases

Leptospirosis

This bacterial infection is spread most commonly by urine contamination of the environment by rodents or wildlife. The bacteria can survive well in a wet environment. Dogs should not be allowed to drink standing water outdoors, particularly in areas where rodents, deer or foxes are known to live. This bacteria is virtually everywhere.

In severe cases, dogs will break with a high fever and weakness. Later on, there may be signs of kidney failure or jaundice, indicating liver involvement. Affected dogs shed large amounts of leptospirosis organisms in their urine. If the disease is diagnosed early, before organ damage has occurred, it is treatable with antibiotics. Untreated, lepto causes death by organ failure.

Vaccination is ineffective as there are many more strains of lepto than are included in the vaccines. It is also thought that this limited protection lasts less than six months post vaccination.

Infectious Tracheobronchitis, Bordatella bronchiseptica (Kennel Cough)

Bordatella is an opportunistic bacterium, causing infection where viral infection has already opened the door, usually parainfluenza or CAV2. Infection is marked by a harsh hacking or honking dry cough. Gentle palpation of the dog's throat will trigger a cough response. The young, elderly or poorly conditioned may progress to a serious case of pneumonia, as will cases complicated by other bacteria, such as streptococcus.

Transmission is by aerosol droplets at fairly close contact (nose-to-nose contact) or by fomite. Treatment is with rest and antibiotics, if a productive cough or nasal discharge are noted. Exposure to cold air or exercise can exacerbate the course of the disease, so dogs with kennel cough require strict rest and isolation from other dogs. Some dogs will benefit from cough suppressants. Kennel cough typically runs its course in 10 days.

Rickettsial Disease

Ehrlichia canis, rickettsia rickettsii and Lyme Disease are all tick-borne diseases that can cause joint pain, fever, muscle pain and effects on blood-cell counts.

Fortunately, if caught early, these diseases are responsive to doxycycline therapy.

Fungal Diseases

Ringworm

Dermatophytosis, aka "ringworm" (microsporum canis, m. gypseum, trichophyton mentagrophytes), is a fungal skin infection that causes hair loss, itching and redness. Ringworm is spread by fomite or direct contact. Ringworm organisms cannot live without organic matter, such as hair or shed skin cells. The spore form is very durable in the environment and can be infective for years.

The young, the elderly and the immune compromised are at greatest risk, as are Persian cats and Yorkshire terrier dogs. Incubation can be anywhere from four days to four weeks, and as many as 10 percent of cats can be asymptomatic carriers.

The vaccine is ineffective, and lufeneron (Program), which had been heralded as a wonder cure, has also proven ineffective. Wood's lamp examination, if positive, is diagnostic for ringworm. Unfortunately, only 40 percent of ringworm infections fluoresce, so negative examination does not rule out ringworm. Suspect hairs may be inspected under the microscope for a telltale appearance, but the most accurate diagnostic test is dermatophyte culture.

When dealing with an outbreak of ringworm, use bleach at a 1:10 dilution and allow 30 minutes of contact time. Make sure to rinse and dry the cage thoroughly before returning the cat to it.

Because ringworm infection in a cat population can be stubborn, and because it can be zoonotic with terrible public relations outcomes, many shelters choose to euthanize ringworm-positive cats in order to limit disease spread within the shelter.

Treatment can be difficult and expensive. Most cases require a long course of shampoos and lime sulfur pet dip, with clipping of long-haired cats. Some cases require oral medication as well, which can be toxic and require blood monitoring during treatment.

Do not take the diagnosis of ringworm in the shelter cat lightly. It is a disease that can easily spread to staff and customers, and can be extremely difficult to remove from the shelter environment.

External Parasites

Fleas, ticks, sarcoptic mange, demodectic mange and ear mites are of concern because they cause discomfort (sometimes extreme) and because these parasites can be vectors of serious disease. Skin and hair coats should be examined closely on admission to the shelter so that the conditions may be treated in a timely fashion.

Internal Parasites

Coccidia

Coccidia are a single-celled protozoan organism that causes diarrhea in puppies and kittens. Adult animals are only transiently infected and do not usually develop diarrhea. Stressed kittens and puppies can develop severely dehydrating diarrhea. Coccidia are very resistant to disinfection, but vigilant removal of feces prevents their transformation to the infective form. It takes between four and 24 hours for this to occur. Any infected

litter should have feces removed every couple of hours to reduce the risk of reinfection. Coccidia are species specific, so cross-contamination between puppies and kittens is not a concern.

Previously treatment was lengthy and laborious, with a 21-day course of sulfadimethoxine. Some strains proved to be resistant. Recently, treatment with ponazuril (Marquis paste – Bayer, an equine product) has shown that a single treatment can be curative. Some shelter veterinarians are dosing ponazuril at 15 mg/kg once a day for three consecutive days and are seeing excellent results. The drawback to ponazuril is that it is very expensive, and four tubes must be purchased at one time. Interested shelters may wish to enter into a purchasing agreement with three other organizations in their area.

Giardia

Giardia is one of the most common protozoan parasites of humans. Many animals are capable of being infected and passing the cysts in their stool, including dogs, cats, birds, horses and cattle. It is most commonly contracted by ingesting water or food contaminated with the giardia cysts.

Giardia can cause diarrhea, especially in puppies and kittens, which may be severe enough to cause weight loss and dehydration.

Metronidazole (Flagyl) or fenbendazole (Panacur) are commonly used to treat giardia, but no treatment is universally successful in preventing the shedding of cysts in the stool. Treatment is only effective in minimizing diarrhea and symptoms in infected animals.

Good hygiene is very important in the prevention and control of giardia. Promptly pick up feces in runs and cages. Bathe animals infected with giardia to prevent re-infection from their hair coat.

Quats are very effective in killing the cysts in the environment, but these compounds rapidly lose their effectiveness in the presence of large amounts of organic matter. So it is essential to physically pick up all fecal matter prior to disinfection.

Roundworms (toxicara)

Shed in very high numbers in the feces of infected dogs and cats, roundworms are easy to treat, but they have serious zoonotic risks. Ingested roundworm eggs will result in larval migrans disease in children. Larval migrans can cause lung inflammation, liver damage, brain damage and blindness.

Untreated cases in kittens and puppies cause unthriftiness and even life-threatening intestinal blockage. The typical roundworm-infected puppy or kitten will have a potbellied appearance and a rough haircoat. The infected adult may appear perfectly healthy.

Hookworms

Hookworms (ancyclostoma) are picked up by migration through the skin or from mother's milk. Hookworms attach to the intestinal wall and feed on blood. Heavy infections can cause anemia, weakness and wasting. Pyrantal pamoate cures hookworm infection. Hookworm eggs can migrate through human skin causing an itchy but self-limiting eruption. Bleach will kill hookworm larvae on cement, but not in moist soil.

Whipworms (tricuris)

Eggs become infective within two weeks after production, and they can remain viable for years. Whipworms cause signs of large bowel diarrhea (loose stools with mucous or blood). Fenbendazole (Panacur) is the most often-used treatment.

Tapeworms (dipylidium, echinococcus, taenia)

Tapeworms are transmitted by fleas, so any flea-infested animal must also be assumed to be tapeworm infected. Tapeworms pass segments that creep around on their own and dry to appear like grains of rice on the anus. Common tapeworm infection is not terribly detrimental to the animal. However, they are a potential zoonotic infection, which should be treated seriously.

Echinococcus tapeworm, however rare, has been reported in the southwestern United States. These worms cause the formation of cysts, a very serious health concern that requires very careful surgical removal. If they rupture, the cysts can seed thousands of other cysts throughout the internal organs. A single cyst in the brain can be fatal.

Tapeworm infections can be treated with Praziquantel (Droncit – Bayer).

Heartworms

Heartworms are transmitted between dogs by mosquitoes. Left untreated, heartworm disease is debilitating and ultimately fatal. Treatment of heartworm infection is costly and hard on the dog, as a highly toxic medication must be used. Dogs require strict rest in the month following heartworm treatment, as the worms break up and circulate through the body. Worm fragments can interrupt blood supply to the lungs, brain or intestines, with fatal complications.

Fortunately, heartworm disease is far easier to prevent than it is to treat. Shelter dogs should be given monthly heartworm preventive, such as ivermectin/pyrantel (Heartgard Plus – Merial), milbemycin oxime (Interceptor – Novartis) or selamectin (Revolution – Pfizer). Cats are also vulnerable to heartworm infection, and if they are potentially exposed to mosquitoes in an endemic area, give cats selamectin on a monthly basis.

Whenever possible, heartworm testing and heartworm disease staging should occur prior to administration of the preventive. Then, give dogs preventive medications on a monthly basis regardless of test status in order to reduce the available microfilaria (baby worm) population for mosquitoes to pick up. The use of a heartworm preventive in a heartworm-positive dog runs the risk of anaphylaxis as the microfilaria die off, but the benefit to the remainder of the dog population outweighs this risk. The use of preventive in the heartworm-positive dog creates a situation known as “occult heartworm disease,” detectable by antigen testing only.

Preventive Recommendations

Vaccinations

Vaccination recommendations for the shelter environment differ from those recommended for animals in a home. Most often, previous vaccination status of shelter animals is unknown. The most prudent approach, therefore, is to consider each animal entering the facility as unvaccinated.

Vaccination in the shelter setting will not prevent outbreaks of disease. Early vaccination, meaning the moment the animal arrives, or as close to arrival as possible, gives the animal an advantage in the race between immunity and disease. If the animal was exposed to the disease before coming into the shelter for vaccination, he may still break with disease. In some cases, however, vaccination may lessen the intensity or duration of disease. Also, some animals will not respond to vaccination in a protective manner. For those individuals, no degree of vaccination will prevent disease.

Vaccines not to use:

Using too many vaccines can have a detrimental effect. Too many antigens administered at once can overwhelm the immune system and lessen the strength of the immune response. The more vaccines used increases the likelihood of an adverse vaccine reaction.

Rule out vaccinations for diseases that are self-limiting or treatable. In the shelter setting, the Lyme vaccine, giardia vaccine, corona, leptospirosis, Chlamydophila (C. felis), ringworm (m. canis), FeLV and FIP vaccinations may be wasted money. Many of these vaccinations are of so little added benefit that they are not worth the cost of administration.

Lyme – Effective tick preventive is the best Lyme disease preventive. This vaccine has a high rate of vaccine-associated illness. It is not fully protective and will cause false positive when screening for Lyme disease.

Giardia – This vaccine is expensive and may be considered for limited times during disease outbreak. Most shelter animals are not at great risk for exposure.

Corona – This infection is considered to be protective against parvovirus and is certainly the lesser of two evils. Also, the vaccine is not terribly protective.

Leptospirosis – Vaccinations for leptospirosis are of limited efficacy and are available for only a small number of the strains that exist. Rodent control and not allowing shelter animals to drink standing water outdoors will provide greater protection against Lepto than the vaccine.

Chlamydophila – Because signs of disease associated with C. felis infection are comparatively mild and respond favorably to treatment, and because adverse events associated with use of C. felis vaccines are of greater concern than adverse events associated with use of many other products, routine vaccination against C. psittaci infection is not recommended.

Ringworm – The m. canis vaccine is no longer being produced because it had a tendency to cause the disease symptoms to disappear, but not eliminate the carrier status of the cat. There may be some vaccines still available through

distributors, but they are not recommended.

FeLV – Because cats in a shelter are in a closed community with no contact with FeLV-positive cats, this vaccine is also not recommended.

FIV – As above, cats in a shelter are in a closed community with no contact with FIV-positive cats. One major drawback to this vaccine is that it will cause cats to test positive on routine FIV testing.

Feline infectious peritonitis – Considerable controversy surrounds the ability of this vaccine to prevent disease. Some studies demonstrate protection from disease, while others show little benefit from vaccination. At this time, there is no evidence that the vaccine induces clinically relevant protection, and its use is not recommended.

Feline bordatella – This vaccine may be of use if the pathogen is identified in a disease outbreak, but otherwise, bordatella is rarely implicated in feline upper respiratory infection.

Vaccines to use:

Modified live vaccines (MLV) are recommended for their properties that provide quicker immune protection. It is important that staff learn to differentiate between mild vaccination symptoms that mimic actual disease and real disease outbreak. The biggest differentiating factor is the presence or absence of fever.

Local or topical vaccines are recommended for diseases that enter via the topical route. This means an intranasal vaccine is recommended for feline herpes and calici viruses. For canine bordatella, the intranasal vaccine is recommended.

Parenteral (injected) vaccines are recommended for all other infectious diseases. The intranasal administration of the panleukopenia vaccine is not thought to be protective. If the trivalent upper respiratory and panleukopenia vaccine is used, it should be backed up by the use of the injectable panleukopenia vaccine.

Core Vaccinations

Core vaccines are those that should be administered to every animal as it enters the shelter.

For cats, the core vaccines are:

- Panleukopenia MLV (modified live) parenteral
- Herpes (also known as rhinotracheitis)
- Calici virus MLV topical
- Rabies, non-adjuvented

For shelters that are having difficulty lowering feline upper respiratory rates, the parenteral FVRCP (Feline Viral Rhinotracheitis, Calici virus, Panleukopenia) may be given in addition to the intranasal vaccine, thereby further reducing outbreaks.

For dogs, the core vaccines are:

- Distemper MLV
- Adenovirus 2
- Parvovirus MLV
- Parainfluenza (this combination is known as DAPP)
- Rabies (killed)
- Bordatella intranasal

Bordatella intranasal can have a combined parainfluenza and adenovirus 2 component, but should not substitute for the parenteral DAPP.

Individual risk-assessment and vaccine protocols can be developed as needed by

the adopters' veterinarian. The individual animal's lifestyle will be evaluated, and the veterinarian may recommend further vaccines at that time. Also, an individual shelter profile may require modifications to the core vaccines outlined above in conjunction with an advising veterinarian. These guidelines are intended as a suggested starting point.

Puppies should be vaccinated with bordatella and DAPP at 6 weeks of age and boosted every two weeks until out of the shelter. Kittens may be vaccinated with the intranasal upper respiratory components at 2 weeks of age. This can be boosted at 6 weeks of age along with panleukopenia, also administered at 6 weeks old.

The best protocol places litters of puppies and kittens into foster homes outside of the shelter. Litters visit at 6 weeks for vaccination and return at 8 weeks for adoption. The recombinant PurVax rabies vaccine by Merial has the advantage of being approved for use in 8-week-old kittens. Puppies must wait until 12 weeks of age for rabies vaccination.

Pregnant animals should not be vaccinated with any modified live vaccines, as this may cause abortion or problems with fetal development.

Deworming

All animals should be prophylactically dewormed with a broad-spectrum dewormer, such as pyrantal pamoate (Strongid, Nemex). Further tailored deworming may be done as needed and indicated by fecal floatation tests. The best preventive medicine programs obtain fecal floatations on all animals in the shelter. The minimum monitoring to be done is to conduct fecal floatation on all animals with either diarrhea or vomiting.
The Centers for Disease Control (CDC) recommends an aggressive routine deworming to prevent human exposure to toxicara eggs, including these guidelines for dogs and cats:

Dogs:

Puppies should be dewormed at 2 weeks of age and every two weeks until 3 months old. From 3 to 6 months, puppies should be dewormed once a month, and then four times a year for life. Lactating bitches should be treated at parturition and then every two weeks with the puppies. Newly admitted dogs to the shelter should be dewormed at admission, with the dose repeated in two weeks. Heartworm preventive administered monthly year-round can serve as the strategic deworming medication.

Cats:

Kittens should be dewormed at 3, 5, 7 and 9 weeks, then monthly until 6 months of age. Adults should be dewormed four times a year. Lactating queens should be treated concurrently with kittens. A good choice for strategic deworming in cats is Drontal because it treats roundworms and tapeworms, the zoonotic species that cats most often carry.

Screening

All cats over 6 months should be screened for both FeLV and FIV. Kittens under 6 months may be tested for FeLV only. There are concerns with both false positives and false negatives when testing for FIV in kittens less than 6 months of age.

Counsel adopters to have their cats retested in six months. If an adopter is looking to add a new cat to a household of

existing cats, the safest bet would be an owner-surrendered, indoor-only cat with a negative FeLV/FIV test. Cats with positive FeLV or FIV tests must be strictly isolated from other cat populations.

Flea Control

Cases inundated with fleas should immediately use nitenpyram (Capstar – Novartis), an oral product that causes rapid death of the resident fleas, usually within 30 minutes. This should help prevent the establishment of fleas within the facility.

Ongoing flea prevention should be implemented with a topical spot-on product, such as fipronil (Frontline – Merial), imidacloprid (Advantage – Bayer) or selamectin (Revolution – Pfizer). In tick-endemic areas, Frontline, Advantix (Bayer) or Revolution are appropriate choices for dogs. For cats, Revolution is the best choice because it eradicates fleas, ticks and ear mites. Revolution is also helpful in areas afflicted with sarcoptic mange, as this product also kills sarcoptic mange mites.

Grooming

All animals in the shelter environment should be free of external parasites, burrs, hair mats or other uncomfortable foreign materials in the fur.

Monitoring

Every animal should be observed for behavior and attitude each day. If any changes are noted, closer examination is indicated.

Zoonoses

A zoonotic disease is one that may be transmitted from animals to people. Zoonotic agents can be viruses, bacteria, fungus, or internal and external parasites. Those most vulnerable to zoonotic disease include the very young, the very old, pregnant women, chemotherapy patients, transplant patients, those with immunosuppressive diseases or those on immunosuppressive medications. These folks are particularly at risk of having serious or even fatal outcomes from diseases such as bartonellosis (cat scratch fever), salmonella, bordatella, toxoplasmosis and lymphocytic choriomeningitis virus (LCMV, carried by rodents).

Other zoonotic diseases include giardia, hookworm, roundworm, tapeworms, tick paralysis, campylobacter, shigella, clostridium, helicobacter, tritrichomonas, echinococcocus, ringworm, scabies, rabies, pasturella, leptospirosis, yersinia pestis, monkey pox, ehrlichia, Rocky Mountain Spotted Fever (RMSF), Lyme disease and hanta virus. This list is far from complete, as new disease organisms or modes of transmission are discovered regularly.

Some of these diseases are transmitted directly from animal to human by bite exposure, such as rabies or bartonella. Other diseases require a vector, such as a tick, to transmit the disease, like RMSF. Others, such as salmonella, are transmitted passively from handling and then oral ingestion. A fatal disease may be transmitted as quickly as a child holding a reptile and then chewing her fingernails or sucking her thumb.

The principal routes of zoonosis transmission are dermal or mucocutaneous contact, bites and scratches, inhalation of droplet aerosols, ingestion and vectors. Provide hand-washing facilities to employees and visitors alike, and encourage their frequent use through signage and verbal reminders. Where hand-washing facilities are not available, provide waterless alcohol-based hand sanitizers. Advise parents to be vigilant of their children's activities.

Shelters are more likely to see zoonotic diseases than other animal facilities. This is because animals come from random sources, even out of state or out of the country. Some shelters are direct importers of animals from other geographic areas, while others are recipients of the fallout from well-meaning but under-resourced rescue groups. Shelter animals are likely to have not had any previous preventive health care, such as protective vaccines or routine dewormings. Animals may have been roaming before arriving in the shelter system and may have picked up a variety of diseases. Once in the shelter, animals experience environmental factors that promote zoonotic disease, including stress and high animal density.

The public should never be allowed to interact with animals showing any disease symptoms. Because immunocompromised or immunosupressed individuals may be reluctant to reveal their health status and may wish to maintain privacy, there should be some signage and literature regarding zoonotic disease available. This way, visitors may peruse them at their own volition and in private.

Animal Stress

Stressors play a significant role in the health status of shelter animals. Stressed animals are more likely to shed infectious disease organisms through diarrhea or other symptoms. Stress can be brought on by a variety of conditions and can be expressed through obvious or obscure clues. A stressed animal may be either withdrawn or hyperactive. Animals should be observed for signs of stress.

Stress reduction measures within the kennel enclosure include soft classical music, toys, a comfy bed, hiding and perching spots for cats, an outdoor view (if possible), fresh air and behavioral enrichment devices, such as stuffed Kongs for dogs and Kitty Kongs for cats. Use volunteers as much as possible to provide behavioral enrichment: brushing, petting, soothing talk, play, walking and manners instruction.

Pain exacerbates stress, and stress exacerbates pain. Train staff to recognize painful conditions and to alleviate suffering for humane and disease-control reasons. If an animal must be held for stray time after having been injured or while suffering with painful conditions, such as arthritis, the pain must be addressed. Measures taken may be as simple as providing deep bedding or may require veterinary intervention and the use of pain medications. If animals are frequently chewing at their surgical sites post-spaying or neutering, it may be time to have a discussion with your veterinarian regarding post-operative pain control measures. We have it in our power to alleviate or eliminate animal suffering, and we should take our responsibility to do so with profound seriousness.

Hunger is an easily avoided stressor in the kennel environment. A minimum of twice-daily feeding is recommended to lessen the chance of hunger. Puppies and kittens should be fed an age-appropriate food at least three times daily. In addition, the stress of the kennel environment increases the requirement for energy. The stressed animal exerts more calories by not sleeping and by pacing, shivering, jumping and barking. All animals should be weighed weekly to monitor for weight loss. Ensure provision of appropriate foods, particularly for exotic species, to be sure that what has been set in front of them is truly a good food. Consistently feeding the same brand of high-quality food is highly recommended. Although shelters often get donated food, changes in diet can result in inappetance, vomiting and diarrhea. Donated food is best utilized as a resource for fosters or a food bank for needy pet owners in the community, rather than for feeding shelter residents. Great care must be taken when re-feeding the starved animal and should be undertaken with veterinary guidance. Animals who have been starved for long periods of time may be unable to absorb nutrition, leading to explosive diarrhea, dehydration and protein loss that the starved animal cannot afford.

Boredom can lead to behaviors that endanger health. Some animals will engage in repetitive behaviors that can cause painful stress on joints or infected skin eruptions from licking. Again, these conditions can make an animal more vulnerable to infectious disease.

Separation anxiety is a difficult suffering to address in the shelter situation. Most often what (or who) animals pine for is no longer available to them. Sometimes these animals can be comforted by animal

companionship or special attention from volunteers. Others will only do well out of the shelter in a foster situation, and some never do well without serious pharmacologic and behavioral intervention.

Overstimulation from noise and activity may be rough for some animals, until they become habituated to the kennel environment. Measures such as hanging a blanket over a cage, providing a crate within the enclosure or moving an animal to a quiet location may ease the discomfort and associated stress.

Temperature extremes — particularly cold for the very young, the very old, the very small and the sparsely hair-coated — can create serious discomfort. On the other hand, heat and high humidity can be unbearable for the obese, giant breeds and heavy-coated animals. Special provisions must be made for these animals, including coats, blankets, moving to a different area, providing a child's wading pool or other measure to alleviate this suffering.

Conclusion

In summary, preventing disease outbreaks from occurring in a shelter setting requires a consistent effort to reduce the numbers of animals at risk through prompt and appropriate vaccination, by maintaining a healthy facility through disinfection, by keeping a watchful eye on the population and by immediately isolating suspect cases from the general population. Maintaining clear records of all of the above preventive measures allows for review and revision in times of failure. Those records should include:

- **Vaccination:** All incoming animals should be properly vaccinated.
- **Disinfection:** Maintain unrelenting dedication to disinfection.
- **Surveillance:** Keep constant surveillance of incoming and currently housed animals.
- **Health records:** Keep timely records of the health of the shelter population, and even more timely records for quarantined sick and exposed animals.
- **Population management:** Manage the movement of all animals within the shelter.

Good shelter disinfection and disease-control measures are cost saving and humane. They can also help stabilize the workforce by preserving morale through the avoidance of mass euthanasia in times of disease outbreak. These measures improve public relations and responsible social interaction. A clean and healthy shelter is a happy place to be.

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Glossary

Abscess A pus-filled cavity within tissue

Alkalinity Opposite of acidity, having a high pH level

Asymptomatic Infection without symptoms

Bacteriocidal Kills bacteria

Biodegradable Metabolized to non-toxic matter in environment

Carrier state Harboring disease agents without showing symptoms

Contagious Can be transmitted

Disinfect To free from infection, especially by destroying harmful microorganisms

Enteroviruses Viruses that infect the digestive tract

Enveloped viruses Have an extra coat supplied by the host cell; easily inactivated

Euthanasia Humane deliberate death

Fungicidal Kills fungi

Gram-negative A more complex bacterial cell wall defined by staining

Hard water Contains salts of calcium, magnesium or other chemicals

Hemorrhage Bleeding

Incubation period Time span from infection to start of symptoms

Intermediate host Host where parasite passes non-reproductive stage

Killed virus vaccine Virus is unable to reproduce

Maternal antibodies Those passed to offspring (in milk) to grant immunity

Modified Live Virus (MLV) Virus can reproduce but is unable to cause disease

Mucous membranes Lining of mouth, vagina, eyelids, etc.

Non-enveloped virus No extra coating; difficult to inactivate

Pathogen A disease-producing organism

Pneumonia Inflammation of the lungs

Prophylactically Given to prevent disease rather than to treat disease

Secondary bacterial infection Bacterial infection following previous infection by another pathogen

Sporicidal Kills bacterial spores

Sterilization To free from living microorganisms

Virucidal Kills viruses

Zoonotic Disease transmissible from animals to man