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**Note:** *Because this article is long and talks about shelters that are obviously larger than the one at PALS, the areas of most relevancy have been bookmarked. If you don't want to read through the entire piece, just click on the bookmark that you're interested in to view that subject.*

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## Cleaning and Disinfecting in Shelters

### Introduction

We spend a lot of time and energy cleaning and disinfecting shelters, and rely on this as a major barrier against disease. A clean shelter encourages adoptions and public support as well as protecting animals from disease. However, incorrectly performed, disinfection and cleaning can be ineffective or actually serve to spread disease. Disinfectants can even cause significant harm if used incorrectly. Detailed guidelines on cleaning and disinfection of shelters are available at the UC Davis Shelter Medicine Program Website, at [www.sheltermedicine.com](http://www.sheltermedicine.com) (shelter health portal, information sheets, cleaning and disinfection)

### Four elements of an effective shelter sanitation program

1. Use effective products
2. Clean where it counts
3. Minimize stress and fomite transmission
4. Perfection not required and not an excuse!

To understand the challenge (and opportunity) of cleaning animal shelters, it is necessary to keep in mind a few key concepts:

**Carrier:** An animal which is infected and infectious to other animals but not currently showing signs of disease. What this means is that even healthy looking animals can spread disease to other animals. This can occur in several scenarios:

### Animals that are just about to get sick

- E.g. parvovirus can be shed a few days before signs develop

### Animals that have recently recovered

- Most infections can be shed for a few days to a few weeks after recovery
- Some infections may be shed for months or even years, e.g. feline calicivirus)
- The more recently-recovered animals you have in the general population, the more significance post-recovery shedding can have. For this reason, some shelters house recently recovered URI cats in separate adoption areas from vulnerable kittens or those cats who have never been ill

### Chronically infected animals

- Some infections create a long-term carrier state, in which the animal appears healthy most of the time, but constantly or intermittently sheds disease and is infectious to others. The animal may or may not appear sick during periods of shedding.
- Healthy adults may have a sufficiently strong immune system to show no signs from a chronic infection, but may pass severe disease to young animals
- Many infections are activated by pregnancy and nursing, so moms should be kept separated for the

population's sake as well as their own protection

- Feline herpesvirus (associated with feline URI) is particularly problematic in terms of a carrier state. The vast majority of cats that recover from this infection will remain carriers, and shedding (with or without signs) is specifically activated by stress.

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### **Mode of transmission: this is the method by which disease is spread, and may include:**

- Vectors: living creatures such as fleas and ticks which transmit disease
- Direct contact
- Droplet (4-5 feet)
- Airborne
  - Uncommon for cats; not a method by which feline upper respiratory infection is spread!
- FOMITES: objects such as hands, contaminated surfaces, exam supplies, food and water dishes, etc. that serve to mechanically transmit disease
  - A great way to demonstrate fomite transmission: [www.glogerm.com](http://www.glogerm.com)

**Dose effect:** It takes more than one or two germs to create disease in an animal. Often the required dose is in the millions or even billions of particles. Dose required depends on both virulence of the germ in question, and the animal's immune status. Increased dose leads to greater likelihood of disease, faster transmission, and more severe disease.

Elsewhere, we discuss supporting the animal's immune system to withstand a higher dose. Here, we discuss methods to reduce the dose of disease to which animals are exposed. Remember, we do not need to attain a zero dose, just lower the dose enough that the animal's immune system can ward off the rest. Shelter sanitation is about lowering that dose enough to give the animals a fighting chance. If your shelter is especially hard to clean because of an old, dilapidated facility, you will need to work extra hard to support your animals' immune systems and take special measures to protect your most vulnerable shelter animals (especially puppies and kittens).

### **Getting down to brass tacks: what products should we use for cleaning and disinfection?**

#### **Cleaning products**

Three types of product are generally used for environmental cleaning:

- **Soap/detergent:** Cleaning agent which works by suspending dirt and grease. Does not kill harmful microorganisms.
- **Disinfectant:** Chemical agent which kills harmful microorganisms. Does not necessarily remove dirt or grease.
- **Degreaser:** More powerful soap/detergent specially formulated to penetrate layers of dried on body oils and other greasy debris.
- Some disinfectants also have some detergent/cleaning activity. Bleach has none.

#### **Choosing a disinfectant**

In order to be effective, all disinfectants share some features:

- Disinfectants **MUST** be used at the correct concentration.
- Adequate contact time is required.
- Disinfectants must be applied to a basically clean, non-porous surface, free of organic matter.
- Disinfectants and detergents can cancel each other's actions, and should not be mixed unless specifically directed by the manufacturer.

There is no single perfect disinfectant for use in all circumstances, just as there is no perfect antibiotic for all infections. Shelters should become familiar with a small arsenal of disinfectants suitable for a range of uses.

Strengths and weaknesses of various common disinfectants are listed in the table below. ONLY disinfectants specifically designed for use around companion animals and tested as safe and effective against the pathogens of concern should be used. This is not a place to get creative! Remember, a shelter is not a hospital or a day care center – people don't sit in the toilet and then lick themselves afterwards, but cats and dogs have full body/oral contact with whatever chemicals are in the environment.

<b>Disinfectant</b>	<b>Good points</b>	<b>Cautions</b>
<b>Quaternary ammonium compounds (Roccal, Parvo-sol, A33, Maxxon, many others)</b>	Some detergent activity	Not reliably effective against parvo, panleukopenia, calicivirus or ringworm
	Only moderate inactivation by organic matter (less than bleach)	Inactivated by soaps and detergents
	Low tissue toxicity	
	Inexpensive	
<b>Bleach (Sodium hypochlorite)</b>		
Usually used at 1:32 dilution of 5% household bleach (1/2 cup per gallon), applied to clean, non-porous surface. For bleach containing other than 5% sodium hypochlorite, use our handy bleach calculator to determine correct dilution.	Completely inactivates unenveloped viruses when used correctly	Significantly inactivated by organic matter, exposure to light, or extended storage.
	Effective against ringworm at high concentration	NO detergent activity
	Low tissue toxicity	Fumes can be irritating at high concentration
	Inexpensive	
	Can be combined with quaternary ammonium compounds	Corrosive to metal.
		Hard water reduces effectiveness.
<b>Potassium peroxymonosulfate (Virkon® or Trifectant®)</b>	Completely inactivates unenveloped viruses when used correctly.	Not reliably effective against ringworm
	Some detergent activity	More costly than bleach
	Low tissue toxicity	

Disinfectant	Good points	Cautions
	Less corrosive to metal than bleach	
	Relatively good activity in the face of organic matter	
	Comes in powdered form, not designed for application through hose-end applicator systems (can be applied through pesticide sprayers or specialized delivery systems)	
	Leaves visible residue on some surfaces	
<b>Chlorhexidine (Nolvasan®)</b>	Very low tissue toxicity.	Relatively expensive.
		Ineffective against unenveloped viruses, ringworm.
<b>Alcohol (usually in hand sanitizer)</b>	Less irritating to tissue than quaternary ammonium or bleach.	
<b>Ethanol (70% concentration)</b>	Moderately effective against calicivirus	

### Selected agents not killed by routinely used disinfectants at normal concentrations

#### Ringworm (*Microsporum canis*)

Only thing that inactivates ringworm completely in one application is undiluted 5% bleach or formaldehyde; too harsh for shelter use[Moriello, 1995 #68].

2 applications (24 hours apart) of bleach diluted 1:10 (1.5 cups 5% bleach per gallon of water) is reasonably effective

#### Many internal parasite eggs such as roundworm, whipworm

Pretty much requires a flamethrower to kill

Can be dislodged from smooth surfaces following damage to outer protein coat by 1% bleach (3 cups 5% bleach/gallon of water)[Bowman, 1999 #150].

Consider prophylactic treatment to avoid environmental contamination

#### Coccidial and protozoal cysts (such as toxoplasma, cryptosporidia)

Best killed by high temperature steam heat i.e commercial dishwasher, flamethrower

Consider prophylactic treatment to avoid environmental contamination

## Selected agents not killed by routinely used disinfectants at normal concentrations

### External parasites such as cheyletiella, scabies (sarcoptic mange) and fleas

Especially when home-like environments become contaminated

Pesticides required for effective elimination[Moriello, 1992 #161].

Consider prophylactic treatment to avoid environmental contamination

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### Planning for imperfect disinfection

- No matter what you use, it won't destroy all pathogens
- Periodically use a different disinfectant (e.g. once a week)
- Mechanical cleaning with soap and water helps a lot
- Surfaces in shelters should be non-porous and durable to facilitate cleaning. This includes flooring, furniture, dishes, litterpans and play structures in all animal areas.
- Exposure to sunlight and drying destroys many infectious agents. Moisture and cold (even freezing) actually help most germs survive.
- Dirt and grass outdoor areas can become heavily contaminated over time. Parvo and many parasite eggs are virtually impossible to eliminate from such areas once contaminated. Puppies should not be allowed access to outdoor areas until dewormed and completely protected by vaccination.

### Prevent what you can't kill or where you can't clean

If a stainless steel cage gets contaminated with ringworm, no big deal – even without disinfection, stainless steel can be so well cleaned mechanically, you will be able to get rid of all the fungus. If a group cat room gets contaminated with feline herpesvirus, it's also not a disaster – even if something hard to clean like a cat tree gets contaminated, the virus will die off on its own within a day or two. But put something like ringworm, which never dies on its own, together with something like a cat tree, which can't be very well cleaned, and suddenly you have a problem. That's why quarantine, careful screening and/or prophylactic treatment for hard-to-kill pathogens in hard-to-clean areas is so important. Hard-to-clean areas often include feline group housing, play yards, staff offices and foster homes.

- Quarantine 1-2 weeks for parvo/panleuk
- Screen for ringworm
- Treat for roundworm and hookworms
- In high risk populations, treat for coccidia, Giardia, whipworms
- Make sure puppy, kitten, new intake and sick areas cleanable
  - Concrete, gravel, straw
- Maximize sunlight on grass

### What really needs cleaning?

#### Focus your precious time and energy on the most important areas for cleaning:

- Pre-vaccination surfaces
  - It is imperative that animals have contact with especially clean surfaces when they are first admitted and have no protection from vaccination
  - For example, animal transport vehicles, carriers, exam surfaces, clothing of intake staff
- Animal housing between occupants
  - Pay special attention to kitten, puppy and sick animal areas
- High contact surfaces
  - "Get-acquainted rooms", aisles, exercise areas, door knobs, telephones...
- Daily cleaning and disinfection for pathogens of special environmental concern, e.g. ringworm, parvovirus

- **Yourself!** Remember, we move about shelters much more than animals do. Investing in keeping our hands, arms, clothing and feet clean (either by cleaning or by use of protective garments) will often go at least as far as environmental cleaning in preventing disease spread.

## Perils of Cleaning

There are many ways we can inadvertently foster disease during cleaning. Some things to keep in mind:

### Use correct disinfectants, correctly

Use of disinfectants at the incorrect concentration, disinfectants not formulated for use around animals, or disinfectants that fail to inactivate significant pathogens can pose a significant hazard. There are numerous reports where incorrectly used disinfectants have harmed or even killed animals.

- Prominently post correct dilutions for all commonly used disinfectants.
- Provide all necessary equipment for correct application and keep this in good repair
  - E.g. measuring cups, hose-end foamers, spray bottles and mop buckets with correct level for water and disinfectant marked clearly
- Apply disinfectant for adequate contact time
- Replace disinfectant at recommended interval

### Avoid aerosolization of dirt, hair, litter and respiratory irritants:

Although cats themselves can not create effective aerosols to transmit disease, we can do a very efficient job of contributing to airborne spread of disease ourselves during cleaning. Even if we don't spread germs, filling the air with the irritating fumes of disinfectants can compromise our animals (and our own) respiratory defenses. Reduce these risks by:

- Use a hose-end foamer rather than a sprayer for hose-end application of disinfectant
- Use a nubbin top disinfectant applicator rather than a hand sprayer
- Rags n' buckets are another alternative. To prevent spread of disease from dirty water/rags:
  - Use two double sided buckets (or four buckets, if you can't find double sided buckets) for:
    - Clean and dirty rags
    - Clean disinfectant solution and rinse water
  - Double sided buckets are readily available at janitorial supply houses on the internet.
- Avoid vigorous sweeping when animal are present. Use dust mops, electrostatic cleaners, or damp mops instead.
- Save high pressure hosing or power washing for areas/times when no animal are present

### Avoid contributing to fomite spread of disease

Cleaning cages is one of the "dirtiest" activities in shelters. Imagine all the hair, poop fragments, food bits and other gross things that get stirred up and attach themselves to clothing, hands and arms during the cleaning process. This is especially true if cleaning requires a high level of animal contact (e.g. due to single rather than double sided cages). It is one thing to move all dogs to one side of a set of double sided runs, lower the guillotine doors, and hose out the area. It is quite another matter to physically enter a cage, remove a dog or cat (contaminating hands and clothing in the process) and move it to another cage or temporary holding area. If an ultraviolet light could detect the buildup of germs on clothing over the course of cleaning, no doubt the results would be spectacular. You can get a sense of this by using the product "glo-germ" ([www.glogerm.com](http://www.glogerm.com)), which mimics the spread of germs and does fluoresce under a UV light. Sprinkle some on a stuffed cat, around a cage and in a litter pan, then try handling the cat and cleaning the cage as usual. Light yourself up with a woods lamp afterwards and see where the "germs" have managed to cling. To minimize fomite spread of disease:

- Minimize animal handling during cleaning (see spot cleaning below)

- Evaluate animal health prior to cleaning.
  - In general population areas, mark animals with signs of illness, and handle/clean those animals only after all healthy animals have been cleaned.
- Clean in order of healthy/vulnerable to less vulnerable/sick (see below)
- Do not let animals run loose during cleaning of single cages (e.g. don't let kittens run around on the floor of the cattery while cleaning cages. If animals are allowed loose in common areas, this should take place after cleaning has been completed.)
- Change clothing and wash hands between areas and after cleaning (and before going home to your own beloved pets)
  - Changing clothing after cleaning is probably one of the simplest, most important things you can do to protect animal health. Usually we complete cleaning in the morning, then handle new incoming animals for the rest of the day. If we're still wearing the clothes we had on when we were cleaning, all those new creatures are exposed to a whopping dose of whatever's going around in the shelter before we even have a chance to vaccinate them.

## Order of cleaning

To avoid transmitting disease from healthy carriers to vulnerable animals, cleaning should proceed from the cleanest areas of the building housing the most vulnerable animals to the most contaminated areas and the least vulnerable animals, e.g.:

- Adoptable kittens/puppies
- Adoptable adult animals
- Stray/Quarantine kittens/puppies
- Stray/Quarantine adult animals
- Sick animals and isolation areas
- Separate protective garments, brushes, mops and other supplies should be used for each of these areas.

## Avoid disrupting cats' lives:

- Avoid moving cats from cage to cage or cage to external carrier when possible
  - Moving from cage to cage is sufficient to activate latent herpesvirus infection and cause URI in a significant percentage of cats
  - Moving from cage to cage requires handling when heavily contaminated from cleaning, and fosters spread of disease
- Double sided cages are great – use them if you have them!
- If not, consider in cage cleaning for cats
- Consider small group housing for cats rather than single cages – permits cleaning while cats remain in residence
- If you must move cats from cage to cage, try to keep a carrier with them (ideally) or at least bedding if it is not too heavily soiled.

## Double sided cages

These work great to clean animals efficiently and with minimal disruption. Except in a dire emergency, resist the temptation to over-crowd and place an animal on either side of a double sided set-up. If you must double up, it is preferable to house two compatible animals per double sided run, which still allows the kennels to work in the manner intended. If you're building a new facility, hold out for double sided runs for both dogs and cats (even more important for cats than dogs). This is especially important in new intake areas where disease risk is highest.

## In cage cleaning for cats:

“Spot cleaning” done correctly saves times, reduces disinfection cost and chemical use, lowers potential for staff injury, is less stressful for cats, and reduces fomite transmission from handling during cleaning or trans-

fer to incompletely disinfected cages. This is appropriate for healthy cats, and may also be used for sick cats except those infected with pathogens of significant concern for environmental contamination (e.g. ringworm, panleuk). Suggested procedure:

- Have a carrier or hiding box in cage where possible (even a donut boxes, paper bags, colanders and dish pans have been used in shelters for this purpose)
- Clean gently around cat
- Wipe walls (important to remove snot marks from day to day to permit monitoring); no need to rinse if disinfectant or mild detergent used at correct dilution
  - Hard core disinfection not needed
  - Do not spray around cat
  - Brush out spilled litter
  - Replace litter pan (prepare fresh litter and dump soiled litter away from cats if possible)
  - Leave bedding with cat unless heavily soiled or cat has serious infection (ok to leave URI cats with bedding, but avoid with ringworm, panleukopenia, coccidia, Giardia)
- Deep clean only between cats or when cage is heavily soiled
- Have a few carriers available for litters of kittens or cats that need to be removed to clean heavily soiled cages
  - Clean carriers between uses
- Two useful tools to adapt existing housing for reduced cat stress and easier in-cage cleaning:
  - ACES "feral cat box"
    - [www.animal-care.com](http://www.animal-care.com), look under "Products"; "Animal handling and capture" category
  - BC SPCA Hide Perch n' Go box
    - [www.sPCA.bc.ca/hideperchgo](http://www.sPCA.bc.ca/hideperchgo) (coming soon)
- See [http://www.animalsheltering.org/resource\\_library/magazine\\_articles/may\\_jun\\_2005/spot\\_cleaning\\_a\\_cat\\_cage.html](http://www.animalsheltering.org/resource_library/magazine_articles/may_jun_2005/spot_cleaning_a_cat_cage.html) for a detailed step by step guide.

If single cages are all you've got and you must move animals for cleaning, what are the options?

Spot cleaning is practical for many cats, especially if a hiding place has been provided for the cat to hang out in during cleaning. However, it may not be possible with very active cats or litters of kittens. For dogs, this is generally only practical if they are walked frequently enough to minimize urination and defecation in runs. And for some shelters, cages will only be cleaned well if a hose applicator system is used, which necessitates removing animals from an entire cage bank at a time. In these situations, one of the strategies below can be used.

One empty kennel per cage bank, ward or side: If you don't have enough space to devote a number of runs to temporary holding, you can leave one space empty at one end or the other of a series of kennels and move animals over and clean one at a time:

- Move animal and cage number to empty kennel
- Clean just-vacated cage
- Move animal next door into just cleaned cage
- Repeat as necessary
- Use cattle ear tags, clipboard or other movable kennel numbers so the cage number stays with the animals

This has the disadvantage that runs must be cleaned one at a time, which is less efficient and creates stress and possible respiratory irritation for animals in the adjoining kennels exposed to cleaning chemicals. It is almost impossible to guarantee adequate contact time, so there will be some exposure of each animal to the germs from animals housed on either side. However, this is still preferable than using a single holding run or tying animals out during cleaning, as the holding run or tie-out also will not be adequately cleaned with sufficient contact time, and every single animal is then potentially exposed to all the animals that were in that space previously during the same cleaning cycle

## Carrier for every cat

If cage size is sufficient, carriers should be placed in the cage with each cat, and these should be used to hold the cat during cleaning. Even if there is not room for a carrier in the cage, it can be helpful to assign each cat a carrier for the duration of its stay. For shelters with a high adoption rate, a cardboard (or even plastic) carrier can be assigned to each cat at intake and sent home when the cat is adopted. For shelters with lower adoption rates, this may be excessively costly, as carriers will have to be thrown away when cats are euthanized. If cardboard carriers are not practical, it is still better to assign each cat a carrier or transport cage for the duration of its stay. Cattle ear tags (or other plastic tags) with cage number, ID bands, or tape can be used to identify which carrier goes with which cat. That way the carrier/cage only needs to be cleaned once, between cats, rather than after every single use. This increases the chances it will actually be cleaned well. When carriers are used randomly for cats, sufficient cleaning between occupants is often a problem. When there are fewer carriers than there are cats, this is especially true – adequate contact time with disinfectant is a near impossibility when carriers must be used multiple times during each cleaning cycle. Metal carriers are much better than plastic carriers, especially if they need to be cleaned between each cat. Open wire metal carriers can be pretty well disinfected by dunking them in a large barrel of disinfectant and placing on a slanted surface to thoroughly dry. Plastic carriers are much more difficult to clean, and are prone to getting scratches which can harbor durable pathogens such as panleukopenia or Salmonella.

Extra cage bank or set of runs: If you have an entire empty ward or cage bank, you can move an entire group of animals, clean their runs, then efficiently clean the temporary holding bank you just used. A rolling cage bank can be useful for this purpose for cats and small to medium sized dogs. This has the advantage of allowing efficient cleaning methods such as hose-end applicators and removes animals from the stressful environment during cleaning.

## Extraneous Cleaning Topics

### Foot baths

Studies of foot baths show that even when these are consistently used, they do an imperfect job of preventing disease transmission. Foot baths become quickly contaminated by organic matter, reducing the efficacy of compounds such as bleach and (to a lesser degree) quaternary ammonium disinfectants. Ideally, shoes should be scrubbed as well as dipped in a foot bath; this is rarely practical in a shelter. Certainly, a damp towel emitting a few faint bleach fumes is ineffective at best. If foot baths are used, potassium peroxydisulfate compounds (Trifectant ® or Virkon-S®) or another disinfectant with good activity in the face of organic matter are preferred over bleach. Of course, the disinfectant also needs to be effective against the germ in question – Trifectant ® works well for parvo or panleukopenia, but not so well for ringworm. Disinfectant should be deep enough to cover shoe treads, and foot baths should be changed daily or more often if heavily soiled. When it really counts, such as when actually treating animals for a highly infectious disease such as parvo in a shelter, dedicated boots or shoe covers are preferred.

### Dish washing

- Commercial high heat dishwasher preferred
  - Between high temperature and mechanical cleaning, these are generally sufficient even for durable agents such as parvo/panleukopenia
- If hand washing, WASH before disinfecting
- Separate dishes, toys and litter pans and clean in that order
- Use stainless steel or disposable dishes and litter pans if at all possible

### Laundry

- Hot water
- Bleach – no more than the usual “laundry amount” needed (1/2 cup per load for household size washers)
- Dry in dryer or direct sunlight (avoid hanging to dry in dank, dark areas)
- Do not overload: probably the most important factor! Clumps of poop and hair (or clumps of hairy poop)

can retain infectious agents even in the face of an otherwise effective laundry protocol.

- This protocol seems to be sufficient even for laundry soiled with difficult agents such as parvo and ringworm.

## Power washers

Power washers and variations thereof have the advantage of effectively removing organic debris and dirt. However, a drawback of these devices is that they have the potential to aerosolize harmful germs. This is particularly true of parvovirus – infection by inhalation (versus oral contact) can cause more severe and rapid disease. Therefore, power washers should only be used when no animals are present. Situations in which power washers can be used include:

- Kennels with double sided runs when all animals are moved to one side and guillotine doors are closed
- Move-able cages have been rolled into an area containing no animals
- All animals have been moved out of a ward for deep cleaning
- Remember that workers using power washers also need protection from inhaling aerosolized pathogens

## Hands

Hand sanitation is frequently identified as the number one means of preventing disease spread. While this is undoubtedly very important, remember that when working with animals, our arms and clothing may also have close contact with animals, so hand sanitation alone is insufficient. Certainly, hand sanitation is critical to prevent zoonotic disease transmission – while we may transmit virus from one cat to another via a contaminated garment, we are unlikely to put that garment in our own mouths, whereas hands frequently make their way into contact with human mouths, eyes and noses, where germs gain convenient entry. There are three general methods to deal with hand contamination:

- **Gloves:** Obviously the most reliable method of preventing contamination, gloves do not rely on skill/technique (as hand washing does) and provide protection against even the most durable pathogens (unlike hand sanitizers). Gloves are required when dealing with such pathogens as parvovirus, panleukopenia, and ringworm. The drawback of gloves is the relatively high cost and potential low compliance. Following a Salmonella outbreak, one shelter provided cheap, plastic “sandwich making” gloves and required all members of staff and public to wear and change gloves between handling every cat. Because some people have significant latex allergies, non-latex gloves should be offered and latex containing products clearly marked.
- **Gel or foam hand sanitizers**
  - The advantage of hand sanitizers is ease of installation and use. Remember that higher compliance with a less effective product may actually lead to better results than low compliance with the “gold standard.” The disadvantage is that no currently available hand sanitizer is effective against parvo, panleuk, ringworm or other very durable pathogens, and these products are only partially effective at best against calicivirus. Therefore use of these products may cause a false sense of security.
  - If hand sanitizers are used, the best choice is a product containing 60-90% ethanol. Chlorhexidine, Triclosan, and quaternary ammonium (benzylalkonium) products are less reliable against calicivirus; additionally, Triclosan is a phenol based compound; both phenols and quaternary ammonium have been known to cause toxicity in cats and dogs when applied at high concentrations. Although this has not been documented with hand sanitizer products, it seems prudent to be cautious as transfer to animal’s fur and subsequent licking is probable. A few brands of alcohol hand sanitizers contain less than 60% alcohol – these have been found to actually facilitate transfer of germs rather than decrease it. Therefore, shelters should provide hand sanitizer rather than allowing/encouraging provision of personal supplies.

## Hand washing:

- The advantage of hand washing is that it mechanically removes even those pathogens that are not easily inactivated by chemical disinfectants. Hand washing is required when:
  - Hands are visibly dirty
  - Hands are contaminated with a durable pathogen such as parvovirus, panleukopenia, ringworm or calicivirus

- Therefore, hand washing stations should be available throughout shelters. It is critical that these stations are provided with soap and paper towels at all time – disease transmission is actually enhanced on damp hands, so moistening hands without washing and drying will be counterproductive.
  - Proper hand-washing technique includes:
    - Wet hands with warm running water
    - Lather with soap
    - Scrub all surfaces (away from running water) for a minimum of 20 seconds
    - Rinse
    - Thoroughly dry hands using two single use paper towels (10 seconds each) – if cloth towels are used, a fresh one must be used for each hand washing episode. Hands should be dried for 10 seconds on one area, then 10 seconds on a fresh area of the towel.
- The disadvantage of hand washing is that compliance may be low and/or it may not be performed with proper technique. In one pilot study of various hand hygiene strategies in veterinary students performing physical exams on horse, alcohol hand sanitizers were actually more effective in reducing bacterial counts than hand washing. The bottom line is, multiple options for hand sanitation should be available – at least we can hope that one or another will be used to some good effect.

### **Foster homes, offices, outdoor areas and other places that are impossible to completely disinfect:**

Ideally, we prevent contamination of hard-to-disinfect areas through quarantine and prophylactic treatment as described above. In many cases, even if such areas do become contaminated by a sick animal, simply cleaning gross contamination and waiting a month or so is sufficient to allow any remaining germs to die off naturally. Contaminants that can be dealt with in this way include canine distemper, Bordetella bronchiseptica (kennel cough), canine influenza, feline herpesvirus, feline coronavirus (FIP), FeLV and FIV. Feline calicivirus is somewhere in between – less durable than panleukopenia, parvo and ringworm, but more durable than the preceding listed pathogens. Cleaning gross contamination entails:

- Clean up hair and poop (e.g. pick up yard, thoroughly vacuum home/furniture)
- Launder soiled bedding, toys, clothing etc.
- Wash and disinfect food dishes and litter pans

When the worst happens and hard-to-disinfect areas do become contaminated with a durable and serious pathogen (e.g. parvo, panleukopenia, ringworm, sometimes calicivirus), here are some things to consider:

- 1. Take an inventory.** Think of everything the infected animals may have contacted (think back at least a few days before disease was diagnosed). Were they in a personal car or animal transport vehicle? Are there clothes, towels or blankets they might have touched? Toys, crates or beds you need to worry about? For shelters, think about every kennel and area of the shelter the animals may have passed through – get acquainted areas, offices, play yards, etc. Also consider exposed animals that may be carrying the infection without showing signs (important with ringworm, calicivirus).
- 2. Clean, rinse, and repeat.** If you can't kill the pathogen, in some cases you might just be able to remove it by washing, vacuuming, etc. Even for areas such as kennel runs that are pretty easy to disinfect, there is benefit to washing and scrubbing the area first to make sure there's no organic matter to inactivate your disinfectant. For outdoor areas (weather permitting) flush with plenty of water, allowing the area to dry thoroughly between bouts of irrigation. For indoor carpeted areas, thoroughly clean and vacuum, making sure to get under furniture and into nooks and crannies popular with curious young foster animals. Although steam cleaning is unlikely to attain sufficient temperatures to kill these durable pathogens, it can help mechanically remove yet more contamination. Soiled laundry should be washed in hot water and bleach and dried in a hot dryer. Provided machines are functioning correctly and are not overloaded, this should be sufficient. Stainless steel dishes and cages can be disinfected and kept, but other items such as toys, plastic food dishes, and crates should be discarded.
- 3. Kill what you can.** While bleach is a fine disinfectant for parvo, panleukopenia and ringworm when used correctly, it doesn't do well in the face of dirt and debris and of course can't be used on carpet. Potassium

peroxymonosulfate (Trifectant or Virkon S) much better activity under these circumstances, and is a good product to have on hand for just such an occasion. This product is effective against parvo/panleuk but not reliable against ringworm. It can be mixed at normal strength (1%) and applied via a pesticide type sprayer, or mixed at 10% concentration and applied through an applicator system set at a 1:10 dilution. There is no guarantee you will eliminate every last particle of virus by this method, as it is unlikely you will be able to fully coat every surface of a grassy yard. However, reducing the amount of contamination will likely help. Because prolonged contact time may be helpful, allow at least a couple of hours after application before irrigating an outdoor area. Potassium peroxymonosulfate can even be used to disinfect carpets – obviously test in an inconspicuous area first to make sure it doesn't stain.

- 4. Assess the risk.** For ringworm, success of cleaning can be readily assessed by performing environmental cultures. See the ringworm information sheet for more information on how this can be done. For parvo/panleukopenia and other durable pathogens, unfortunately we just have to make a best guess. Animal sheltering and rescue is all about balancing risks and benefits – it's rare that we get to choose a "no risk" scenario. Risk of re-opening an area to animals is lower if there was relatively light contamination to start with – a pre-clinical pup visiting the area briefly versus a sick litter spewing diarrhea or vomit into every corner. Risk is also likely to be lower if the area is uncluttered and relatively easy to clean, even if it can not be completely disinfected. Risk is lower during the summer in areas exposed to sunlight and drying, and conversely higher in moist, damp or cold areas. Also consider the risk of NOT re-opening the area. If animals will be euthanized for lack of foster care, that's obviously a bigger deal than just closing off a play yard for a month or two.
- 5. Apply tincture of time?** I have heard from foster homes that cleaned carefully after a parvo/panleuk exposure, disinfected where they could, and brought puppies or kittens in again after only a one month waiting period – and did just fine. I have also heard of places having problems even after several months of cleaning and waiting. Once you've done your best to clean and disinfect, and considered the risks from every angle, you may decide to leave an area or foster home closed to vulnerable youngsters for a time. (Usually 1-6 months is sufficient - longer times will be required in moist/dark areas and in cold versus hot, sunny weather.). There is no absolute guarantee that these pathogens will die off even if you close off an area for a year or more. However, repeated cleaning and exposure to sunlight and the elements will gradually reduce contamination. Vaccinated adult dogs are at very low risk of contracting parvo, so foster homes closed to puppies could concentrate on helping older dogs for a time. The same applies to adult cats and panleukopenia. Because of the possibility that canine parvo can infect cats, any place closed to puppies should also be off limits to kittens.

## Implementation

### Whatever you decide to do...write it down!

- Train staff and volunteers
- Check periodically
- Help your colleagues stay sharp
- Reward and acknowledge careful cleaning

### Summary: above all, do no harm

- Avoid fomite transmission during cleaning
- Minimize moves
- Separate supplies for separate areas
- Separate dirty and clean workers or activities
- Change after cleaning
- Use products that work
- Prioritize housing that permits low stress/low movement cleaning
- Prioritize cleaning of important areas
- Train staff to screen for disease before cleaning and before moving animals to un-cleanable areas to pre-

vent spread and contamination

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*Reprinted from the UC Davis Koret shelter medicine website ([www.sheltermedicine.com](http://www.sheltermedicine.com))*