Sanitation to Save Lives

Kate F. Hurley, DVM, MPVM
Koret Shelter Medicine Program Director
Center for Companion Animal Health
University of California, Davis
www.sheltermedicine.com
www.facebook.com/sheltermedicine
Preliminary concept: disease spread

- Direct contact
- FOMITES
- Hairborne
- Sneezee-borne
  - But not for cats
Dose effect

- Dose required = immune status of animal \( \div \) virulence of germ
- Reduce dose by reducing source and/or decreasing transmission
- Increase dose tolerated by supporting animal immunity
Good news and bad news: Every little bit helps reach the tipping point
The upside of sanitation: what’s the best that could happen?

- Protect animals from disease
- Protect staff, client and visitor health
- Create a pleasant and welcoming environment
- Protect the environment and use resources wisely
The downside of sanitation: what’s the worst thing that could happen?

- Waste time, money and chemicals with process that fails to work
- Spread disease to animals and/or staff
- Cause toxicity to animals and workers
To do list

☑ Choose the right products
  • Pathogens, environment, time, staff

☑ Choose the right process of application

☑ Choose the right places to be sanitized
  • people, equipment, surfaces, animals

☑ Write everything down

☑ Check efficacy periodically
Choose the right products
The right products

- Activity: cleaner, disinfectant, degreaser
- Spectrum of effect: un-enveloped viruses, ringworm, others
- Contact time
- Activity in the face of organic matter
- Penetration into porous surfaces
- Ease of application
- Potential toxicity
- Cost

No need to rotate disinfectants per se
Quiz time!

- Sodium hypochlorite aka Bleach
- Sodium dichloroisocyanurate e.g. Bruclean
- Calcium hypochlorite e.g. Wysiwash
- Alcohol
- Potassium peroxymonosulfate e.g. Trifectant, Virkon
- Quaternary ammonium
- Accelerated hydrogen peroxide (e.g. AccelHP)
- Chlorhexidine

Which one(s) aren’t reliable against parovoviruses?

- Sodium hypochlorite aka Bleach
- Sodium dichloroisocyanurate e.g. Bruclean
- Calcium hypochlorite e.g. Wysiwash
- Alcohol
- Potassium peroxymonosulfate e.g. Trifectant, Virkon
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Not reliable against parvoviruses

- Alcohol
- Quaternary ammonium
- Chlorhexidine

Our friends the quats

- E.g. anything that contains the suffix “–onium” or the prefix “quat-”
  - Roccal, Triple Two, Parvo-sol, Lemon-quat…
- Modest detergent activity
- Good with organic matter relative to bleach
- Relatively effective against Giardia
- Flexible application including hose-end and central systems
- BUT…
And it’s a big BUT...
Long history of lack of efficacy against un-enveloped viruses


Un-enveloped viruses include canine parvovirus, feline panleukopenia and calicivirus
Which ones have no detergent properties?

- Sodium hypochlorite aka Bleach
- Sodium dichloroisocyanurate e.g. Bruclean
- Calcium hypochlorite e.g. Wysiwash
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No detergent properties
(as commonly packaged)

Sodium hypochlorite aka Bleach
Sodium dichloroisocyanurate e.g. Bruclean
Calcium hypochlorite e.g. Wysiwash
Alcohol

Sodium hypochlorite and company

- Sodium hypochlorite
  - A.ka. bleach
- Sodium dichloroisocyanurate
  - E.g. Bruclean
- Calcium hypochlorite
  - E.g. Wysiwash
- Proven efficacy against un-enveloped viruses
- Must be applied to pre-cleaned surface
- Inactivated by organic matter
Match the product with its shelf life after mixing

- 24 hours
- 7 days
- 1 month
- 3 months

- AccelTB
- Trifectant
- Bleach
Match the product with its shelf life after mixing

- 24 hours: AccelTB
- 7 days: Trifectant
- 1 month: Bleach IF in a light proof container
- 3 months
Which one is perfect in every way?

- Sodium hypochlorite aka Bleach
- Sodium dichloroisocyanurate e.g. Bruclean
- Calcium hypochlorite e.g. Wysiwash
- Alcohol
- Potassium peroxymonosulfate e.g. Trifectant, Virkon
- Quaternary ammonium
- Accelerated hydrogen peroxide (e.g. AccelHP)
- Chlorhexidine

Trick question 😊
The right tool for the job

- **Unenveloped viruses**: sodium hypochlorite (1:30), sodium dichloroisocyanurate, accelerated hydrogen peroxide, potassium peroxymonosulfate
- **Ringworm**: cleaning then sodium hypochlorite at 1:10, verify efficacy via fungal culture
- **Organic matter (wood, carpets, yards, porous surfaces...)**: peroxygen with surfactant, high quality quaternary ammonium
- **Quick turnaround**: accelerated hydrogen peroxide, potassium peroxymonosulfate
- **Pre-packaged system**: Bru-clean, Wysiwash, AccelTB, various quaternary ammonium compounds
- **Mechanical cleaning, sunlight and drying always helpful**
Combining products

- Bleach + detergent = OK!
- Bleach + quaternary ammonium = OK!
- Any disinfectant + hot water = OK!
- Quaternary ammonium + detergent = possible inactivation
- Potassium peroxymonosulfate or accelerated hydrogen peroxide + bleach = noxious fumes, inactivation of PP
- Bleach + ammonia = deadly gas
Choose the right process
First, do no harm
Which has been most often reported as the cause of this type of injury?

- Incorrectly diluted...
- A. Phenol (e.g. Lysol)
- B. Sodium hypochlorite (Bleach)
- C. Quaternary ammonium (e.g. Roccal)
- D. Potassium peroxymonosulfate (e.g. Trifectant)
Quaternary ammonium toxicity

• Oral and skin ulceration, high fever, rhinitis, vomiting, anorexia, pulmonary edema, pneumonia, neurological signs, death
In case of toxicity:

- Remove source
- Dilute with milk/water if ingested
- Bathe
- Broad spectrum antibiotics
- Pain control
Use the correct product, correctly

- Prominently post dilution instructions
- Provide all needed equipment and measuring devices
  - Tie them down if needed
- Closed containers
  - Light-proof for bleach
- Note storage/remix times for each product
- Label with product, expiration date and initials
The importance of double compartment housing for dogs and cats

• Allows cleaning without disruption of animals
• Limits chemical exposure of animals
• Saves time (no holding area to clean)
• Avoids tracking in and out of dog kennels
Moisture is hazardous to health


  We report here a new and critical determinant of the effectiveness of hand hygiene procedures, namely the amount of residual moisture left on the hands after washing and drying. When samples of skin, food and utilities were touched with wet, undried hands, microbial numbers in the order of 68000, 31000 and 1900 respectively translocated to these representative surfaces. Bacterial numbers translocating on touch contact decreased progressively as drying with an air or cloth towel system removed residual moisture from the hands. A 10 s cloth towel–20 s air towel protocol reduced the bacterial numbers translocating to skin, food and utilities on touch contact to 140, 655 and 28 respectively and achieved a 99.8, 94 and 99% reduction in the level of bacterial translocation associated with wet hands. Careful hand drying is a critical factor determining the level of touch-contact-associated bacterial transfer after hand washing and its recognition could make a significant contribution towards improving handcare practices in clinical and public health sectors.
Remember: Wet, Clean, Disinfect, Dry
Single most important source of shelter cat disease?
Feline cage/condo cleaning

- Clean thoroughly between residents
- “Spot clean” on a daily basis
  - Exception for litters, seriously messy cages
  - Ringworm?
  - Okay for URI, mild illness
Don't forget noise

• Open and close cage doors *quietly*
  • Think about latches when you’re choosing cages

• Replace litter pans calmly, especially metal on metal

• Feed after things have quieted down or before things get crazy
Spot cleaning dogs?

- Only for dogs vaccinated > 3-5 days
  - Tracking in and out of run can spread disease
- No urine or feces on that side of run
- Replace water, soiled bedding
- Replace food if present
- Leave clean-ish bedding in place
- Clean and dry side with urine or feces as needed
Our friend, the gastro-colic reflex?

- Increase in gut motility in response to stomach distention
- Can occur as soon as 15 minutes after a meal
- Consider feeding dogs ~ 30 minutes before cleaning time/walkies to reduce soiling of runs during the day
What is the required contact time for complete disinfection?

A. One minute
B. Ten minutes
C. Two hours
D. It depends
**Contact time**

- Dependent on disinfectant type, temperature, presence of organic matter, concentration, pathogen
  - E.g. drop of ~10 C increased necessary sodium hypochlorite exposure time ~ 2 fold
- Cold, dirty, poor penetration, tough or unknown pathogen: err on the long side for contact time
- No time for contact: optimize temperature, concentration, and product (e.g. accelerated hydrogen peroxide, potassium peroxymonosulfate)
Dependent on pathogen, success of mechanical cleaning and disinfection

- No closure needed if you’re confident of disinfection
- Closure may be inadequate if you’re not confident of disinfection

Consider 3 full cleaning/drying cycles

- Staff to initial each one
Choose the right places to disinfect
Cheap trick

www.glogerm.com
Priorities

- Focus on:
- High contact surfaces, people and body parts
- 1st few hours
- 1st 24 hours
- 1st 3-5 days
- Juveniles always
- Separating populations rather than individuals
Which of these matters most?

A. Hands  
B. Clothes  
C. Feet
We experienced a methicillin-resistant Staphylococcus aureus (MRSA) outbreak in two wards at our medical school teaching hospital during the period of July-September 1997. To determine whether these MRSA clinical isolates were associated with environmental factors, we conducted two sequential MRSA surveys of the hospital staff and surroundings in wards with outbreaks and in one ward without an outbreak. Samples were obtained from the nares, fingers, white coats, and stethoscope of 7 doctors and 7 nurses, and from six surrounding areas of the hospital ward. **MRSA strains were detected mainly from white coats.** This suggested a high probability of cross-infection between the patients and the hospital staff in the ward. Our observations suggest that doctors and nurses should be cautious that their coats might be contaminated with the prevailing strains of MRSA.

Putting things in perspective
35 times as much contamination on scrub top versus hand
Controlling clothing

- Change of clothing
  - Arm coverage
- Between areas/activities
  - Especially prior to handling new intakes, youngsters, after handling sick animals, euthanasia and AFTER CLEANING
- Risk assessment between individuals
- Effective laundering
Laundry

- Remove large food particles, feces, etc.
- Hot water, soap & bleach (1/2 cup per load for standard washer)
- Dry completely
- Do NOT overload machines
- Separate clean from dirty laundry
Which was most effective at reducing bacterial count on vet student’s hands?

A. Washing hands

B. Using hand sanitizer

- Reduction factors (RFs) for bacterial counts on examiners' hands were compared when performing a standardized equine physical examination, followed by the use of one of 3 hand-hygiene protocols (washing with soap, ethanol gel application, and chlorhexidine-ethanol application)…The RFs were significantly different (P < 0.0001) between the hand-washing group and the other 2 treatment groups (the alcohol-gel and the chlorhexidine-alcohol lotion). The use of alcohol-based gels or chlorhexidine-alcohol hand hygiene protocols must still be proven effective in equine practice settings, but in this study, these protocols were equivalent or superior to hand washing for reduction in bacterial load on the hands of people after they perform routine physical examinations.
Hand sanitizers

- Often superior to handwashing
- 60-80% ethanol or isopropyl *alcohol*
- Emollients to protect skin
- 20-30 seconds, all surfaces
- Within 3 feet of point of care

Hand hygiene: hours of youtube fun
More hand hygiene

• Handwashing
  • After contamination with feces, blood, body fluids etc.
  • After inadvertent exposure to durable organisms
  • Thorough drying
• Gloves when it counts
  • Planned exposure to durable organisms, feces, blood, etc.
  • Wash hands after removal
Which type of foot bath was most effective?

A. Quaternary ammonium
B. Sodium hypochlorite
C. Potassium peroxymonosulfate
D. Phenolic disinfectant
E. All were equally ineffective
Footbaths/mats


Foot sanitation

- Sodium hypochlorite and quaternary ammonium footbaths did not reduce bacterial count on boots
- Potassium peroxymonosulfate did reduce bacterial count, but no reduction on floors
- Dedicated boots or shoe covers for serious risk
  - E.g. canine GI
  - Ringworm
- Don’t let cats run around on the floor during cleaning
Follow through: write it down and check for efficacy
• Create and post written procedures
• Train staff and volunteers
• Check periodically
• Discover and punish any slip ups

This probably goes without saying, but...
This probably goes without saying, but...

- Create and post written procedures
- Train staff and volunteers
- Check periodically
- Discover and punish any slipups
- Reward and acknowledge careful cleaning as well as noting the absence there-of
Observe the process periodically
Evaluating success

- [www.glogerm.com](http://www.glogerm.com)
- Concentration test strips
  - E.g. [www.sanitationtools.com](http://www.sanitationtools.com)
- Bacterial and *fungal* culture of environment
  - Chapter 16 for ringworm details
- Periodic observation
  - Dilution
  - Application
  - Handling
Thank you!