Saving lives through sanitation

“The Clean Queen”

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The danger of disinfection: what’s the worst thing that could happen?
It could waste your time
It could *freak out* the animals
It could *fail to work*
It could *spread* disease
It could *harm the animals*
Sanitation that works

- Use effective products correctly
- Clean where it counts
- Minimize stress and fomite transmission
- Perfection not required but at least do no harm
Key concepts: *carrier state*

- An animal which is infected *and infectious* but not currently showing signs of disease
  - Pre-clinical, recovered, chronic
  - Healthy adults, moms, kittens
  - Especially feline URI
Key concepts: dose effect

- Dose required depends on virulence and animal immune status
- Increased dose leads to greater likelihood of disease, faster transmission, and more severe disease
Key concepts: *mode of transmission*

- Vector
- Direct contact
- Droplet (4-5 feet)
- Airborne
  - Uncommon for cats

**Fomites**

Potential deadly weapons?
Modes of transmission
Distemper (urine)
Calicivirus (urine)
Leptospirosis (urine and birth fluids)
Q fever (birth fluids)
Brucellosis (birth fluids)
Parvo/panleuk
Distemper
Calicivirus
Coronavirus
Salmonella
Assorted worms
Many, many more

Ringworm
Calicivirus!
Anything in saliva or feces

FIV
Rabies (nerve tissue)

URI
Calicivirus
Herpesvirus
Kennel cough
Distemper
Salmonella
Parvo/panleuk
FeLV

FIV
Rabies
Cat scratch fever
Abscesses

Distemper (urine)
Calicivirus (urine)
Leptospirosis (urine and birth fluids)
Q fever (birth fluids)
Brucellosis (birth fluids)

Parvo/panleuk
Distemper
Calicivirus
Coronavirus
Salmonella
Assorted worms
Many, many more

Cat scratch fever
Tapeworms
Heartworms
Many tick borne

Ringworm
Calicivirus!
Anything in saliva or feces

URI
Calicivirus
Herpesvirus
Kennel cough
Distemper
Salmonella
Parvo/panleuk
FeLV

FIV
Rabies
Cat scratch fever
Abscesses

Distemper (urine)
Calicivirus (urine)
Leptospirosis (urine and birth fluids)
Q fever (birth fluids)
Brucellosis (birth fluids)
Carrier state plus dose effect plus fomites = disease?
Shelter math: case study

• Goal: understand feline calicivirus, herpesvirus and coronavirus in recently admitted shelter cats
• 2 open admission municipal shelters
• Single cat cages
• Cats sampled at intake and 1 week later
• Visibly sick cats removed from population

Shelter math in action
## Shelter math in action

<table>
<thead>
<tr>
<th>Weeks after admission</th>
<th>Herpes</th>
<th>Calici</th>
<th>Corona</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7/162 4%</td>
<td>17/162 11%</td>
<td>53/162 33%</td>
</tr>
<tr>
<td>1</td>
<td>31/60 52%</td>
<td>10/60 15%</td>
<td>36/60 60%</td>
</tr>
</tbody>
</table>
## More shelter math

<table>
<thead>
<tr>
<th>Age</th>
<th>Herpes</th>
<th>Calici</th>
<th>Corona</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 8 weeks</td>
<td>1/9 (11%)</td>
<td>3/9 (33%)</td>
<td>0/5</td>
</tr>
<tr>
<td>8 weeks – 1 year</td>
<td>2/5 (40%)</td>
<td>2/5 (40%)</td>
<td>9/10 (90%)</td>
</tr>
<tr>
<td>Adult</td>
<td>2/74 (3%)</td>
<td>6/74 (7%)</td>
<td>29/74 (39%)</td>
</tr>
</tbody>
</table>
FeCV transmission

• 56% of cats negative at entry were positive within a week

• Mean level of shedding was 10,000 times higher in kittens (8-16 weeks, n = 6) than adults with primary infections

• Shedding increased 10 – 1,000,000 fold in 9/9 cats after one week in the shelter
Conclusions

• Carrier state is common
• Housing and cleaning strategy was associated with high stress and disease spread
• Exposure occurs early
• Kittens are a menace

No wonder I don’t feel well!
Developing a plan of attack

• What to clean
• How to clean
• What products to use:
  – Detergent
  – Disinfectant
  – Degreaser
• Implementation and follow through
Pick your battles

What REALLY needs careful cleaning?
What *really* needs cleaning?

- Pre-vaccination surfaces
- High contact surfaces
  - Animal
  - Human
- Animal housing *between occupants*
  - Kitten/puppy areas especially
- Sick animal surfaces?

*Examples from your world?*
What *really* needs cleaning?
What *really* needs cleaning?
What *really* needs cleaning?
Basic principles of cleaning

- *First*, clean as much as possible
- *Then*, kill what you can’t clean
- *Dry* the environment
- *Prevent* what you can’t clean or kill
Set-up for success

- Stainless steel
- Sealed concrete
- Plastic?
- Carpet/upholstery?
- Grass?
- Foster home?
  - Ex-pen/airline carriers
Mechanical cleaning

- Removal of “gross” contamination
- Scrubbing
- Detergent
- Rinsing
- Periodic degreasing

Does this look familiar?
Choosing a product

• Cleaning versus killing
  – Soap/detergent cleans
  – Disinfectant kills
  – Degreaser for serious cleaning
  – Deodorizer just de-odorizes
Choosing and using the right disinfectants

• Proven safe for the *species in question*
• Effective against the *germs of concern*
• Stored, mixed and applied *correctly*
  – Concentration
  – Time
  – Temperature, pH, light, mixing, etc.
• Consider convenience and cost
Perils of disinfection


• Toxicosis due to quaternary ammonium compound was diagnosed in 6 dogs. Clinical signs consisted of hypersalivation, irregular vomiting, central nervous system depression, and inflammatory lesions of the feet.
Perils of disinfection

- Toxicosis due to contact and ingestion of a quaternary ammonium disinfectant was diagnosed in cats. Clinical signs included anorexia, hypersalivation, depression, dehydration, stomatitis with mucosal ulceration, nasal and ocular discharge, and ulceration of the skin. The clinical disease resembled viral respiratory infection.
Perils of disinfection


- The clinical, pathological and toxicological findings in a cat poisoned with Pinesol, a household cleaning agent, are reported. Clinically severe depression, with unresponsive pupils and extreme ataxia were observed prior to death. Pathologic changes consisted of severe acute centrilobular hepatic necrosis and renal cortical necrosis. Pinesol specific fatty acids and isopropanol were found using gas chromatographic analysis of kidney and fat. It was concluded that the cat died of Pinesol intoxication.
Perils of disinfection


- A recent case report describes the illness of three cats exposed dermally to pure melaleuca oil for flea control. Clinical signs in one or more of the cats included hypothermia, ataxia, dehydration, nervousness, trembling and coma. There were moderate increases in serum ALT and AST concentrations. Two cats recovered within 48 hours following decontamination and supportive care. However, one cat died ~ 3 days following exposure. The primary constituent of the oil, terpinen-4-ol, was detected in the urine of the cats.
What works?

Which should you avoid?
Particularly troublesome?

- Roundworm, whipworm
- Coccidial and protozoal cysts
- Un-enveloped viruses
- External parasites
Did I mention troublesome?

- Feces from mink with acute mink enteritis were pooled and then allowed to dry out in open tubes kept under a roof in an open shed for one year starting in January. Samples of feces were harvested approximately once a month. The infectivity in vitro was unchanged for the first 5 months, but after mid-summer it decreased abruptly to below the detection level. The transmission of the infection to the experimental animals was successful for all samples showing infective virus by cultivation. One mink inoculated with material collected in October excreted virus. We conclude that parvovirus can survive for at least 5-10 months (or during the winter period) under natural conditions, but complete drying out seems to lead to its inactivation. Mechanical cleaning of the premises is thus as critical as disinfection since virus can only survive the dry summer period if protected by protein or buried in moist soil on the premises.
The right tool for the job

- Parvo, panleukopenia or calicivirus:
  - bleach (1/2 cup per gallon) or potassium peroxymonosulfate*
- Ringworm:
  - bleach at 1.5 cups per gallon
- Organic matter (mop buckets, foot baths, play yards):
  - potassium peroxymonosulfate or quaternary ammonium compounds
- Anything that’s really hard to kill:
  - Mechanical cleaning no matter what

* Trifectant or Virkon-S
Drying: just as important as wetting!
Prevent what you can’t kill or where you can’t clean

• Quarantine 1-2 weeks for parvo/panleuk
• Screen for ringworm
• Treat for roundworms, hookworms, +/- coccidia, whipworms, giardia
• Puppy, new intake and sick areas cleanable
  – Concrete, gravel, straw
  – Maximize sunlight on grass
Perils of cleaning
Yes please

No thanks

*How else do you minimize aerosol irritants?*
Rags n’ buckets

- Single use rags or paper towels
- Two double sided buckets
  - Clean and dirty rags
  - Disinfectant and rinse water
  - Nice for dunking scrub brushes too
Perils of cleaning

What happens to clean THEN kill?
If you must mop...

- Double sided buckets or *at least*...
- Different equipment for different areas
- Mark fill line, provide measuring cups, post correct dilution
- How else do you limit disease transmission through mopping?
Hose-end foamer

• Easier, faster, more effective
• Better coverage
• Correct dilution
  – Ensures efficacy
  – Minimizes cost
• E.g. http://www.animal-care.com/
Built in mixing stations

- Most efficient
- Check with colleagues before installing
- Not compatible with every product, but...
- Less effective product applied correctly will work better than the most effective product applied poorly
What about power washers?

- **Good**: get stuff really clean
- **Bad**: aerosolization of germs and irritants
- **Use only when no animals in area**
  - E.g. double sided runs when *all* animals are moved to one side
  - Roll cage banks outside
- **Special caution during parvo outbreaks**
Perils of cleaning
Dirty Scrubs

No thanks

Yes please

How else do you minimize fomite transmission on clothing?
Perils of cleaning
Pre-cleaning health check
Cleaning order

- Healthy pups/kittens
- Healthy adoptable
- Healthy new intakes
- Quarantine
- Sick
- Different tools and protective clothing between areas
Do no harm

Cage cleaning is not the time and place for kitty exercise
Change after cleaning!

www.glogerm.com
Double sided cages: *use them* if you’ve got them

But what if you’re stuck with this?
Removing animals for cleaning (if you must)

- One empty kennel per side
  - Everyone move down one
  - Use ear tags, clipboard or other movable kennel numbers
  - Each animal only exposed to those on either side
  - Inadequate contact time but better than most alternatives
In cage cleaning for single cages

- Hiding box or carrier to facilitate
- Scoop or replace litter
- Freshen water, replace food
- Wipe snot, poop, etc.
- Leave bedding if possible
- Go all out on heavily soiled cages

“Anti-snuffles cleaning procedure”
Spot cleaning

• Lower cost
• Reduced chemical use
• Less work
• Less stress
• Less fomite transmission
• Frees time to carefully clean between occupants
• What’s not to like?

Step by step at: [http://www.animalsheltering.org](http://www.animalsheltering.org), type “spot cleaning” into search box
Yes please
Two useful tools to adapt existing housing

http://www.animal-care.com
(under “animal handling and capture”)

www.spca.bc.ca/hideperchgo
If you must remove cats for cleaning

- Move down one method or..
- Rolling cage bank or…
- One carrier per cage
  - Cardboard, wire, or to go home with cat
  - Remove from area during cleaning
  - Clean between!
- Leave bedding if possible
Pet peeve
Disinfectant for foot baths

• Must be active in the face of organic matter
• Must be active against the germs in question
• Deep enough to cover shoe treads!
• Adequate contact time
• Changed frequently
• Boots or shoe covers when it really counts!
Dish washing

- Commercial high heat dishwasher preferred
- If hand washing, WASH before disinfecting
- Separate dishes from litter pans
- Use stainless or disposable if at all possible
Laundry

- Hot water
- Bleach
- Dryer
- Do not overload
What about hands?

- Hand washing AND drying and/or…
- >60% ethanol or isopropyl hand sanitizer
  - Not effective against parvo, panleuk, ringworm, +/- calici
- <60% alcohol sanitizer or wet hands are worse than nothing
- Avoid alcohol free sanitizers for now
- Gloves when it really counts

*Human as well as animal health protection*
Keeping things in perspective

versus

Which is a bigger deal for the cat?
Reality versus ideal: what to do if quarantine fails

• Take an inventory
• Mechanically clean/irrigate/dry/sunlight
• Assess success if possible
• Evaluate risk:
  – Keep closed for 1-12 months
  – House low risk population
  – Re-open if benefit outweighs risk
True or false?

- Cages should be closed for 72 hours following contamination with a serious pathogen such as parvovirus?
False

- If disinfection is *ineffective*, parvo will survive much longer than 72 hours
- If disinfection is *effective*, no need to keep cage closed
- Repeat full cleaning, disinfection, drying cycle twice to be on safe side
- If organic matter contamination possible, extend disinfectant contact time (1-24 hours)
Sanitation summary

• Correctly use safe, effective products
• Prioritize cleaning of important areas
• Prioritize housing that permits low stress/low movement cleaning
• Avoid fomite transmission during cleaning
• Early recognition of disease to prevent fomite transmission and contamination of un-cleanable areas
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
Disinfection resources

- www.sheltermedicine.com
- Animal Sheltering Magazine
  July 2003, May 2005
  (www.animalsheltering.org)
- Greene’s Infectious Diseases of the Dog and Cat
- Seymour Block: Disinfection, Sterilization and Preservation
Questions?

Huh?
The end!