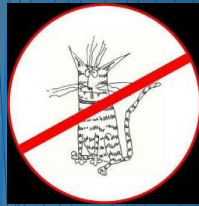
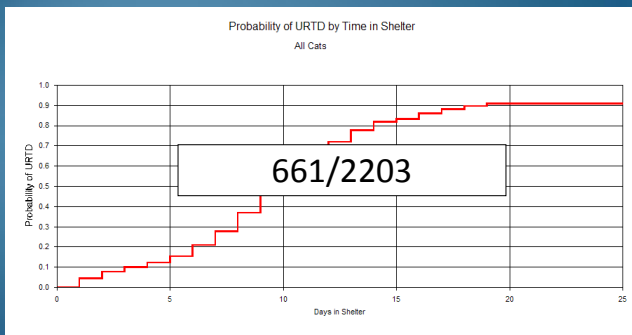


Knocking the SNOT out of Feline Upper Respiratory Infection

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

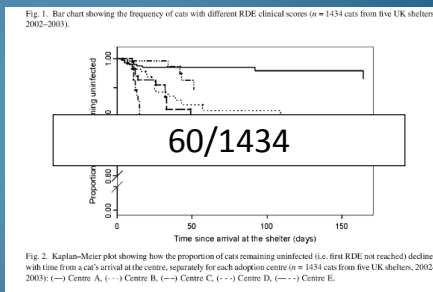


Disease risk in a pretty typical U.S. shelter



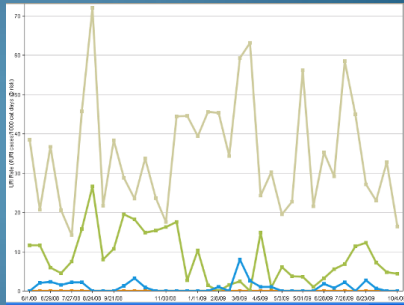
Dinnage, J. D., J. M. Scarlett, et al. (2009). "Descriptive epidemiology of feline upper respiratory tract disease in an animal shelter." J Feline Med Surg.

Disease risk at 5 U.K. cat centres



Edwards, D. S., K. Coyne, et al. (2008). "Risk factors for time to diagnosis of feline upper respiratory tract disease in UK animal adoption shelters." Prev Vet Med 87(3-4): 327-39.

Right here in the U.S. of A.



URI frequency in the shelter ranged from 4.4% to 25%

Why???



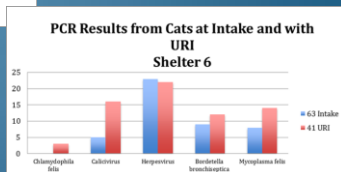
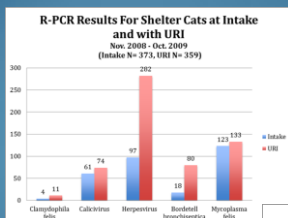
How I used to think

What causes feline URI?



- HERPESVIRUS
- CALICIVIRUS } ~ 90%
- Chlamydomphila felis
- Bordetella
- Mycoplasma

More nuanced understanding



What causes feline URI?



- Herpesvirus causes vast majority of “endemic” shelter URI
- Calicivirus and Bordetella are sporadic problems
- Chlamydia is rare but problematic when it occurs
- Mycoplasma is common and important secondary player

Herpesvirus versus calicivirus



- Airborne transmission? ✖
- Fomite transmission? ✔
- Carrier state? ✔
- Stress associated? ✖
- Vaccine resistant? ✔
- Consistent biotype? ✔
- Corneal ulcers? ✖
- Oral ulcers? ✔
- Limping? ✔
- Virulent systemic disease? ✔
- No signs at all? ✔



Herpesvirus re-activation



- STRESS
- Pregnancy/birthing
- Moving from cage to cage
 - Housing change induced shedding in 18 - 83%
- Introduction of new cats – especially intact
 - Infection activated in cats negative after 2 steroid treatments

Gaskell, R. M. and R. C. Povey (1977). Vet Rec 100(7): 128-133.
Maggs, D. J., M. P. Nasisse, et al. (2003). Am J Vet Res 64(1): 37-42.
Hickman, M. A., G. H. Reubel, et al. (1994). Lab Anim 28(4): 320-329.

FAQ: When this cat is clinically recovered, will she be a particular risk to others?



No!!!

What about this one?



The answer depends on the signs in *these* cats



Calicivirus risk assessment

- Evaluate risk posed by *individual* based on disease manifestations in *group*:
 - Severity of worst disease
 - Health, age and vaccine status of affected individuals
 - Presence or absence of co-factors
 - Apparent ease of spread
- Risk likely reduces over time and with full resolution of signs
- Highest risk if healthy adults from clean environment are affected

FCV does not equal VS-FCV!!!

	# of cats	Calici	Herpes	Borde-tella	Mycoplasm	C. felis
Well	259	71 (27%)	42 (16%)	30 (12%)	15 (6%)	1 (.4%)
URI	314	89 (28%)	92 (29%)	25 (8%)	65 (21%)	14 (4%)
Odds ratio		1.04 (.7-1.5)	2.15 (1.4-3.2)	.99 (.6-1.7)	4.26 (2.4-7.7)	12.02 (1.6-92)

Bannasch, M. J. and J. E. Foley (2005). "Epidemiologic evaluation of multiple respiratory pathogens in cats in animal shelters." J Feline Med Surg 7(2): 109-119.

The number one rule out for sudden death in shelter cats?



Diagnosis of URI – why bother?

- Unusually severe or frequent disease in *population*
- Suspected Chlamydia or *rule out* others in individual
- At least 5-10 acutely affected animals
- Most affected location or per laboratory instructions
- Quantitative RT-PCR may help distinguish important versus vaccine/carrier in future



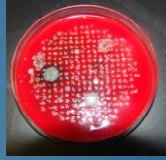
Treatment



a.k.a. the least effective, but still important, tool for control of feline URI

Bacterial infection in URI

- *Pasteurella* species, *E coli*, *Streptococcus*, *Enterobacter* and *Staphylococcus* species
 - Gram negative and gram positive
- *Mycoplasma* very common
 - No cell wall
- *Chlamydophila* and *Bordetella* sporadically important
 - Intracellular
- Revisit stress management, crowd control, air quality as first defense



Veir, J. K., R. Ruch-Gallie, et al. (2008). "Prevalence of selected infectious organisms and comparison of two anatomic sampling sites in shelter cats with upper respiratory tract disease." *J Feline Med Surg* 10(6): 551-557.
Schulz, B. S., G. Wolf, et al. (2006). "Bacteriological and antibiotic sensitivity test results in 271 cats with respiratory tract infections." *Vet Rec* 158(8): 269-270.

General treatment guidelines

- Antibiotics only when clearly indicated
 - *Including if always indicated*
 - *Not including if not always indicated!*
- Consistent 1, 2 plan based on categories of signs/severity
 - *Mycoplasma/Chlamydia/Bordetella vs. secondary*
- *Evaluate early and often in shelter, treat to either cure or failure rather than time*



General treatment guidelines



- Practical considerations:
 - Cost, route, frequency, side effects
 - Less ideal given correctly is better than ideal given wrong
- Above all, do no harm
 - One cat, one set of drugs
 - Doxy: liquid or flush, milk products ok, citric acid can cause toxic byproducts, 7 day max

DOXYCYCLINE POTENCY AFTER STORAGE IN A COMPOUNDED FORMULATION FOR ANIMALS. Mark G. Papich, Daria DiGiovanni, and Gigi Davidson, North Carolina State University, College of Veterinary Medicine, Raleigh, North Carolina, USA.

Chlamydia treatment scheme



- Suspicious clinical signs
- Responds to doxycycline, clavamox, fluorquinolone, azithromycin, topical tetracycline within 7 days
- Signs recur within 14-30 days
- Responds again to **doxycycline**
- Continue 4 weeks minimum
- Put up for adoption on treatment once signs resolve
 - Good foster to adopt candidates

Remember Chlamydia is uncommon: consider PCR before second round of treatment

Consistent plan

Category	Clinical signs	Probable interpretation	Treatment
1a	Clear discharge from eyes/nose, sneezing, squinting	Mild viral URI	Isolate. Monitor appetite/energy/behavior/status daily.
1b	Clear discharge	Category 1a AND Fever, dehydration, anorexia, conjunctivitis, congested	As for 1a AND additional minimal treatment and supportive care as described below.
2a	URI with clear, yellow or bloody nasal discharge	Viral URI with secondary bacterial infection	Doxycycline BID x 7 days or oral trimethoprim-sulfamethoxazole. If improvement but relapse after 7 days, consider alternate antibiotic. If improvement but relapse after 4-6 weeks of continued or suspected CR, for adoption when clinical signs resolve.
2b	Colored discharge	Category 1a AND Green or yellow ocular discharge	Very rare: mild secondary bacterial ocular infection. Topical antibiotic Ophthalmic BID x 7 days or oral trimethoprim-sulfamethoxazole. If no improvement after 7 days, provide systemic antibiotic treatment (if not already done, consider diagnostic tests, see notes on Chlamydia below).
3	URI with colored discharge, facial response to desferrioxamine	Viral URI with moderate to severe secondary bacterial conjunctival infection	FLU/ITV/TMV to determine retroviral status if not already done. Enrofloxacin BID. Recheck every 2-3 days for improvement.
4	Unilateral or bilateral ocular discharge with or without conjunctivitis and/or chemosis	Primary bacterial or viral-ocular infection	Category 1a AND Oxytetracycline Ophthalmic BID x 7 days. Enrofloxacin Ophthalmic BID x 7 days. Ceftriaxone Ophthalmic BID x 7 days. Tetracycline Ophthalmic BID. If fails to respond within 7 days, discontinue topical treatment (some clinicians can

<http://www.sheltermedicine.com/documents/sample-uri-treatment-protocol>

The importance of medical records!

- Multiple cats and observers means written record extra important
 - Daily observation of signs
 - Written dose, duration, route as usual
 - Initials of person giving drug



<http://www.sheltermedicine.com/node/307>

Don't forget supportive care as needed

- Delicious, stinky food
- Fluids
- Pain control
 - Especially if ulcers
- Humidification/nebulization
- Appetite stimulants
- Nose drops EONostril/EOD
 - Try saline drops first
- Fever reducer
- Balance with stress



“Room for recovery”



http://www.oprah.com/health/Hospital-Room-Design-Better-Hospitals-Hospital-Room-Recovery_1

Room for recovery

Private Room: Not having a roommate slashes the risk of airborne infection: A seven-year study showed that nursing home residents in private rooms were three times less likely to catch the flu. Single occupancy means better rest, too. Canadian researchers reported that ICU patients bunking solo got 1.3 more hours of sleep.

Carpeting: Research also shows that visitors (who provide valuable social support and physical assistance) tend to stay about eight minutes longer on average when rooms are carpeted.

A View of Nature: Research published in the journal Science compared postsurgical patients who had a view of trees with those who had a view of a brick wall. The nature gazers needed fewer pain meds, suffered fewer minor complications (such as fever, nausea, and constipation), and stayed an average of .74 fewer days at the hospital.

Sound-Absorbing Ceiling Tiles: Swedish researchers who installed high-density fiberglass tiles in an ICU discovered that they lowered noise levels slightly. As a result, patients had more restful sleep, and a lower rate of rehospitalization.

Light-Filled Window: At a Pittsburgh hospital, post-op patients who recovered in sunny rooms took 22 percent less pain medication per hour than patients in dim rooms. Another study found that in cardiac ICUs, the death rate runs about 61 percent higher in facilities that lack natural light.

Treatment area guidelines

- Natural light, good air quality, big comfy cages, hiding spots or half-cage-covers, minimal noise
 - No dogs allowed!
- Dedicated equipment, protective tops, gloves or hand wash before and after handling cats
- Forget about footbaths
 - Shoe covers if something truly awful going on
- Play/lap sitting area ok
 - Ideally off to the side
 - Do not use for suspect calici
 - Shut down if unusually severe disease



Chronic or nonresponsive "URI"

- Population?
 - Isolation/treatment conditions?
 - Flow through issue from isolation to adoption?
 - Unusual pathogen?
- Individual?
 - Stress, poor immune function plus the usual?
 - Chlamydia, polyp, fungal, deep bacterial plus structural compromise?
 - Lymphoplasmacytic rhinitis, neoplasia, dental issues, foreign body?



Chronic or nonresponsive URI



- Initiate after two rounds of appropriate (different) antibiotic tx
 - Chlamydophila
 - Gram negative
- Careful physical exam
 - Nasal versus ocular versus both
 - Unilateral versus bilateral
- Retrovirus testing

Additional basic diagnostics for chronic URI

- Polyp check
- Aerobic bacterial culture
- PCR panel (Chlamydia, Mycoplasma)
- Biopsy?
- Nasal flush



Chronic or nonresponsive URI treatment



- Antibiotics with good penetration
 - Doxy, clindamycin, clavamox, azithromycin
 - If antibiotic response, continue 8 WEEKS
- Humidification/nebulization
- Outdoor access
- Foster or adopt: unlikely risk to pet cats
- Do not keep in limbo in isolation!

Now lets get back to the fun stuff



How do we prevent this?

What causes feline URI?



- Ineffective vaccination?
- Improper disinfection?
- Poor nutrition?
- Lousy air quality?
- No place to hide?

Vaccination basics



- Mitigates severity but does not prevent infection; takes time to protect
- SC MLV FVRC for all > 4-6 weeks on entry + 2-3 week booster
 - 2 weeks before entry if possible
- Revaccinate kittens SC every 2 weeks while in high risk environment, every 3-4 when not
- Final vaccine at 20 weeks in whatever environment
- Mixed reviews on the IN vaccine
 - In the face of an outbreak?
 - For kittens in addition to SC?
- 2 way calici vaccine for adult long stay shelter cats/pets in foster homes
- Revaccinate high risk adults annually especially after hiatus from exposure

Disinfection basics

- Calicivirus
 - Bleach and its ilk, potassium peroxymonosulfate, accelerated hydrogen peroxide
 - NOi: quats, chlorhexidine
- Stress, fomite transmission and respiratory irritation can cause more harm than good
- Spot clean during residence, focus cleaning on high contact surfaces
- Tops stay with populations, cleaned after sick cat contact and before well cat contact
- Sometimes compromise on sterility is worth a decrease in stress
 - E.g. spacious, warm, comfy housing versus stainless steel
 - New intake versus long term, kittens versus adults



Nutrition basics

- Offer palatable, highly absorbable, consistent diet
 - Have variety on hand for picky eaters
- Separate food and litter by at least three feet
- Dim lights and/or cover cage
- Avoid pairing feeding with aversive activities
 - Smells, sounds, disruption



e.g. www.crijopets.com

Speaking of nutrition...



- Two recent studies conducted in animal shelters showed no benefit of lysine supplementation for preventing URI (1,2)
- Two studies have documented more severe URI in supplemented cats (2,3)

Lysine references for the curious amongst you

1. Drazenovich, TL, Fascetti AJ, Westermeyer HD, Sykes JE, Bannasch MJ, Kass, PH, Hurley, KF, Maggs, D.J.. "Effects of dietary lysine supplementation on upper respiratory disease and infectious organism shedding in cats within an animal shelter." American Journal of Veterinary Research, Submitted 10/12/08. Manuscript ID AJVR-08-10-0330
2. Rees, T. M. and J. L. Lubinski (2008). "Oral supplementation with l-lysine did not prevent upper respiratory infection in a shelter population of cats." J Feline Med Surg.
3. Maggs, D. J., J. E. Sykes, et al. (2006). "Effects of dietary lysine supplementation in cats with enzootic upper respiratory disease." J Feline Med Surg.

Air quality basics

- ✓ Droplet spread possible up to five feet
- ✓ At least 1.5 open cage/condo sides if possible
 - ✓ More important the smaller the cage
- ✓ Minimize irritants
 - ✓ Spot clean, no spray
- ✓ Use fans after cleaning
- ✓ Open doors and windows
- ✓ Utilize outdoor space whenever possible
- ✓ Don't hang your hopes on air filters



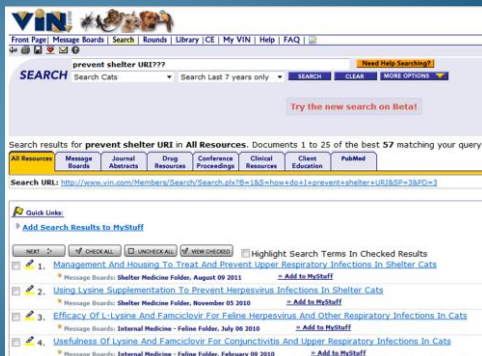
Hiding place basics

- Shelf may be preferable to box if floor space is limited
- Box maybe preferable to shelf is height is limited but floor space adequate
- Partial front cover and towel in cage may be best choice if both floor space and height are limited
- Tailor to individual cat in small small cages



<http://www.sheltermedicine.com/shelter-health-portal/information-sheets/building-an-elevated-bed-for-use-in-shelter-cat-housing>

What if you tried all this and you're still looking for answers?



VIN, Shelter Medicine Folder, 8/2011

I work at a non-profit, open admissions shelter... In the past, the summer months have brought us rampant URI in cats, and our live release rates have been less than ideal (2010 was 54% for the month of July). We have an amazing new building that opened in 2009, and has 126 Shorline cages for cat holding (in addition to the adoption floor, which has two "kitty cities" for group housing and 16 cat "condos" that are basically tiny rooms instead of cages).

In 2010 we adjusted the temperatures in the cat lofts higher so the kitties wouldn't be as cold, we added hiding boxes and Kuranda beds, but we didn't see any changes in the URI rates. Cats were being euthanized daily because the URI was so widespread, and the severity of the illnesses were much greater than you see in private practice URI. Cats would go to foster for URI and be there for MONTHS with sneezing or conjunctivitis.

Hmm...now what?



Environmental and Group Health Risk Factors for Feline Respiratory Disease in Animal Shelters

49 questions including cage size, material and number, hiding place, handling, infectious disease control, vaccination, feeding, timing of S/N, air quality, natural light, dog exposure

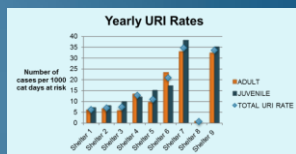
After all that, what mattered most?

all_URI_OT2	IRR	Robust Std. Err.	z	P> z	[95% Conf. Interval]
new_cifs_2	.8466349	.1243785	-1.13	0.257	.6349145 1.129134
new_cifs_3	.4895522	.0599454	-5.04	0.000	.3853484 .6221882
mixed	-.3275651	.1583542	-2.31	0.021	.1269998 .844875
in_total_cme	1.179146	.3084261	0.63	0.529	.7061895 1.969857
Wetness_low	3.891459	.0399889	9.06	0.000	3.261876 4.893059
Intranasal-e	1.463807	.3018267	1.85	0.065	.9771741 2.192782
new_hs_2	1.050598	.4976885	0.10	0.917	.415101 2.659687
new_hs_3	-.7965234	.2267483	-0.80	0.424	.4559162 1.391593
new_season_2	-.722167	.0468721	-5.02	0.000	.6359025 .8201339
new_season_3	-.7874888	.0896001	-2.10	0.036	.6300792 .9842234
new_season_4	-.9176195	.1682131	-0.47	0.639	.640656 1.314318
Total_heal*rs (exposure)					

Greater than 9 square feet of floor space but not 6-8 compared to < 6
 Limited movement in first 7 days
 All large cages were compartmentalized

Big differences

Shelter	Total Feline Intake	Total Healthy Care Days	Total Number of URI Cases	URI Prevalence (as % of intake)	Annual URI Rate
1	4548	44537	278	6.1%	6.24
2	1236	25690	178	14.4%	6.93
3	3630	35316	259	7.1%	7.33
4	1918	22017	281	14.7%	12.76
5	1505	12581	137	9.1%	10.89
6	7140	86097	1798	25.2%	20.88
7	6819	43437	1504	22.1%	34.62
8	652	29120	20	3.1%	0.69
9	2734	14123	475	17.4%	33.63



~ 50 fold variation between shelters on per day basis
 ~ 8 fold variation as percentage of intake
 50, 531 total sick cat days
 13% of care days overall, range < 1% to ~30%

Stay tuned!

Fixing the Feline Housing Crisis: How Shelter Housing Can Make Cats Sick - And What You Can Do About It

September 2012

Cats are extremely sensitive to noise, crowding, and stress - three things that are in abundant supply in many animal shelters. These adverse conditions often lead to illness in sheltered cats, particularly the most common of all feline shelter diseases, upper respiratory infection (URI).

The good news is that by decreasing crowding and reducing stress, you can drastically cut the incidence of feline URI in your shelter's cat population.

Maddie's Institute™ is pleased to announce the second in a two-part series on feline URI in shelters: *Fixing the Feline Housing Crisis: How Shelter Housing Can Make Cats Sick - And What You Can Do About It*. Join us for this free webcast on Thursday, October 25, at 9 PM Eastern, presented by Dr. Sandra Newbury of the Koret Shelter Medicine Program at the UC Davis School of Veterinary Medicine.

Register for the free webcast [here](#)

Related Links

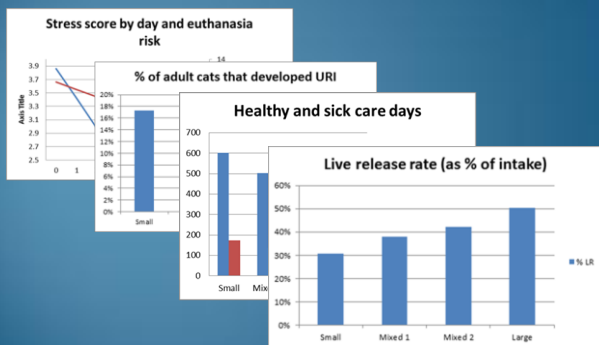
- UC Davis Koret Shelter Medicine Program
- Guidelines for Standards of Care in Animal Shelters
- Knocking the Snot Out of Feline URI: Saving Shelter Cats' Lives with Treatment and Prevention

http://www.maddiestfund.org/Resource_Library/Fixing_the_Feline_Housing_Crisis.html

Does this really work?

- In February 2011, we took a huge step and cut holes in between cat holding cages, and inserted PVC portholes, effectively doubling the space available to each cat and cutting the number of cages we had in half. Actually less than half - because each loft had an odd number of cages, there is a set of triple cages in each loft. We've now got 60 separate cat holding cages. These portholes were designed to be permanent openings, we did not make any "doors" to close because then it's too tempting to revert to less space and more cats. We had many staff and volunteers who were very leery of the change, fearing that more cats would be euthanized because we lacked space.

Cage size, stress, health, length of stay and live release



Magic

- We saw some effects right away. The lofts were immediately quieter, cats seeming more relaxed. There were very few cats "fake sleeping". The longer term effects are just starting to show up. Cat isolation is empty today, because our URI rates have plummeted. Cats aren't breaking with URI right before or after adoption. And now that the statistics for July are in, we found that our live release rate for felines in July 2011 was 70%. In 2010 it was 54%. We euthanized 140 fewer felines in July 2011 compared to July 2010 - and those numbers include the cats we euthanize on intake for lack of space.



Still not perfect

- We still have to remind ourselves occasionally that we don't have enough homes to save every cat we otherwise could right now. But making the euthanasia decision earlier on is saving a lot of staff time and stress, and in the long run we've got healthier cats to adopt. Healthier cats will make a difference in the reputation we have, and pave the road to even higher adoption numbers.



Positive outcomes for "unadoptables" can improve health of "adoptables"

Cats: San Jose shelter spays, releases strays
Candice Jones, Chronicle Staff Writer
Tuesday, January 9, 2012

“Sometimes we just have to laugh because it almost seems impossible that one program can impact the numbers so significantly. This was one of those areas of the operation that we didn't even know would improve until after we started the program and realized what a positive impact it was having on the incidence of URI and our capacity to handle URI.”

Year	Incidence of URI
2008-09	High
2009-10	Medium
2010-11	Low
2011-12	Very Low

San Jose's animal shelter is among the first in the country to try a new approach to dealing with feral and stray cats. Instead of euthanizing those that aren't adoptable, the shelter spays or neuters them and releases them back to the vacant lot or back alley from which they came.

Additional Notes: