

Feline Upper Respiratory Infection: Diagnosis & Treatment

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**KORET
SHELTER
MEDICINE
PROGRAM**

Etiology



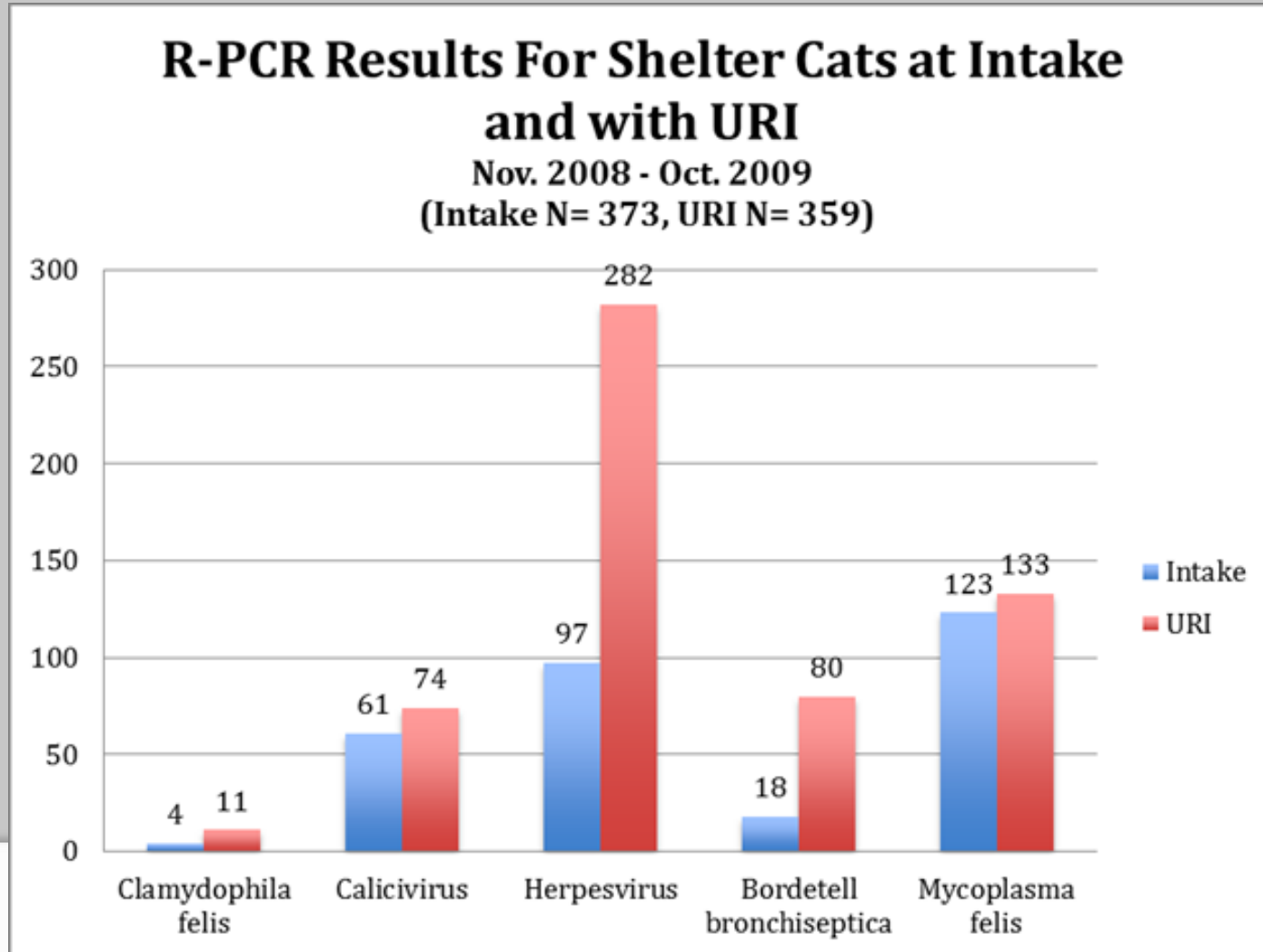
What causes it?

What causes URI in a shelter?

- *Bordetella bronchiseptica*

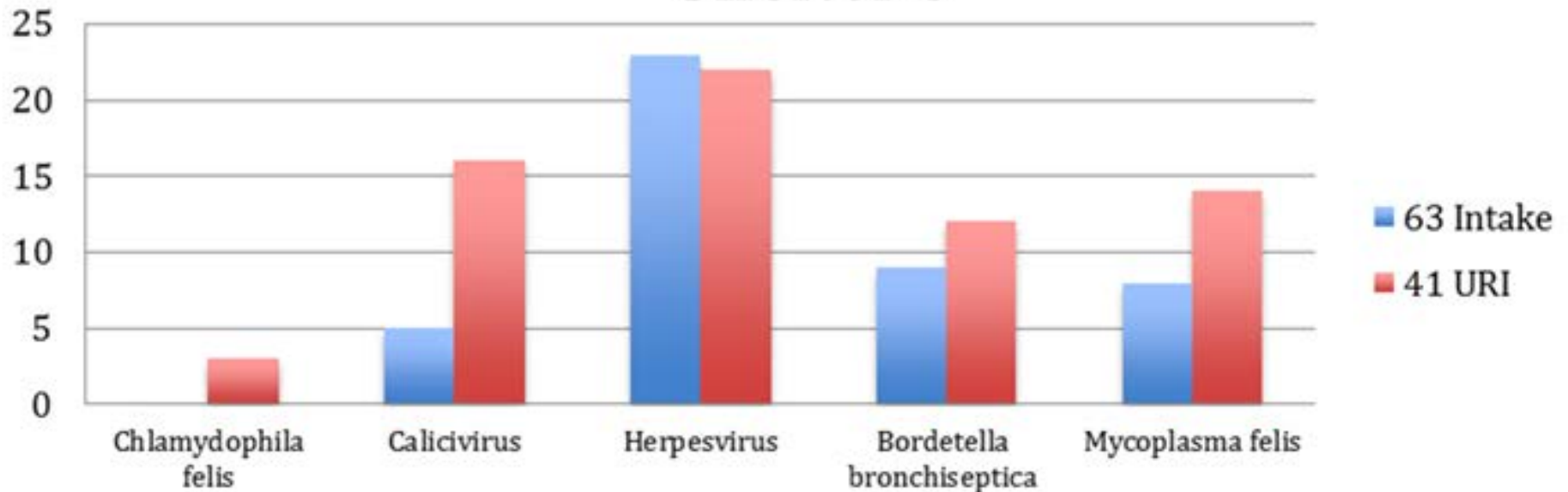


What causes it in the shelter w/ high URI rate?



What causes it in a shelter w/ low URI rate?

PCR Results from Cats at Intake and with URI Shelter 6



What causes it in the shelter?

- Herpesvirus = majority of endemic shelter URI

What does this mean...?

Implications for URI management

- Calicivirus
- *Chlamydia*
- *Mycoplasma* = common but mostly a secondary player



Risk Factors

- Stress
- Inadequate housing
- Crowding
- Poor air quality
- Poor sanitation
- Host health
- Length of stay



Why It's Challenging

Multifactorial disease

- Pathogens
- Host factors
- Environmental factors

Presence of pathogens in clinical & nonclinical cats

- Cats enter with viruses
- How to prevent transmission?

Overlapping, non-specific clinical signs

- How to diagnose?

Costly & impractical to do diagnostics on every cat

- When are diagnostics needed?

How to manage it?

- Different treatment options
- Shelter policies?

Vaccine does not induce sterile immunity

- How to prevent?



Characteristics



Transmission

- STRESS → reactivates herpesvirus
- Fomites
- Direct contact
- Droplet transmission up to 5 ft
- Aerosolization not as important



- Should the public be allowed to touch the cats?



Disease Course - Herpesvirus

- First timer
 - Incubation = 2-6 d
 - Shedding period = 14-21 d
- Reactivated
 - Lag phase = 4-11 d
 - Shedding period = 1-13 d (avg 7d)



Disease Course - Calicivirus

- Incubation period: 2-6 d
- Shedding period: typically < 30 d
 - Carrier state → can be lifelong shedder
 - In shelter setting, ~25% of cats can be shedding at any one time



Recognition & Identification



Diagnosis

- Overlapping clinical signs → makes diagnosis of a specific pathogen difficult
- Pathogens are found in healthy cats → presence of pathogens does not prove disease causation
- Disease severity & course are variable based on host, environmental, and pathogen factors



Clinical Signs

Limping

- Calici

Oral Ulcers

- **Calici**
- Herpes

Keratitis/Dendritic
Corneal Ulcers

- Herpes

Conjunctivitis w/o
nasal signs

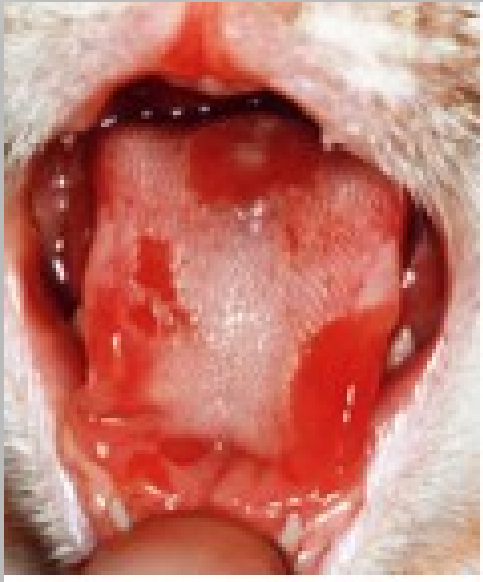
- *Chlamydia*
- *Mycoplasma*

Dermatitis/Dermal
Ulcers

- **VS-Calici**
- Herpes



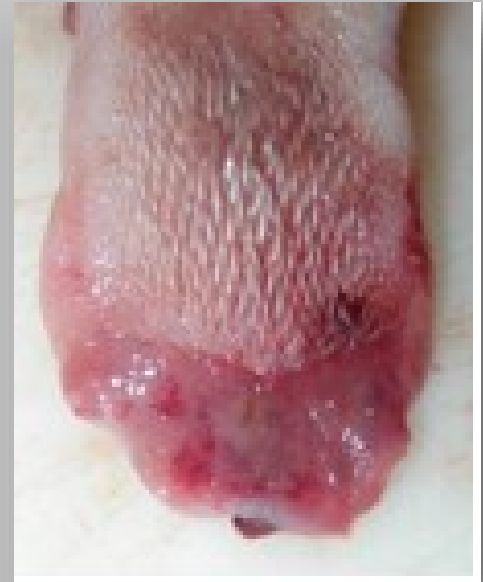
Lingual Ulceration



Calicivirus



Quat toxicity



Herpesvirus



Clinical Features - Bacterial Pathogens

- *Chlamydia felis*
 - Conjunctivitis
 - Responds to treatment but signs recur
- *Bordetella bronchiseptica*
 - Coughing may be more common
 - Transmission between dogs & cats possible
- *Mycoplasma* spp.
 - Commensal in URT
 - Unclear role



Common Diagnostics

- Primary
 - PCR
 - Necropsy
- Secondary
 - Bacterial culture + sensitivity
 - Virus isolation



Challenges of PCR

- Chronic infections → low level shedding → false negatives
- Subclinical shedding → makes positives hard to interpret
- Avoid topical anesthetics + fluorescein → reduces sensitivity
- Recent MLV vax → false positives



When to do diagnostics

- Persistent disease > 7-10 days
- Unusual, severe, increased frequency of signs
- Lower respiratory disease present
- Changing infectious disease protocols



Who to test

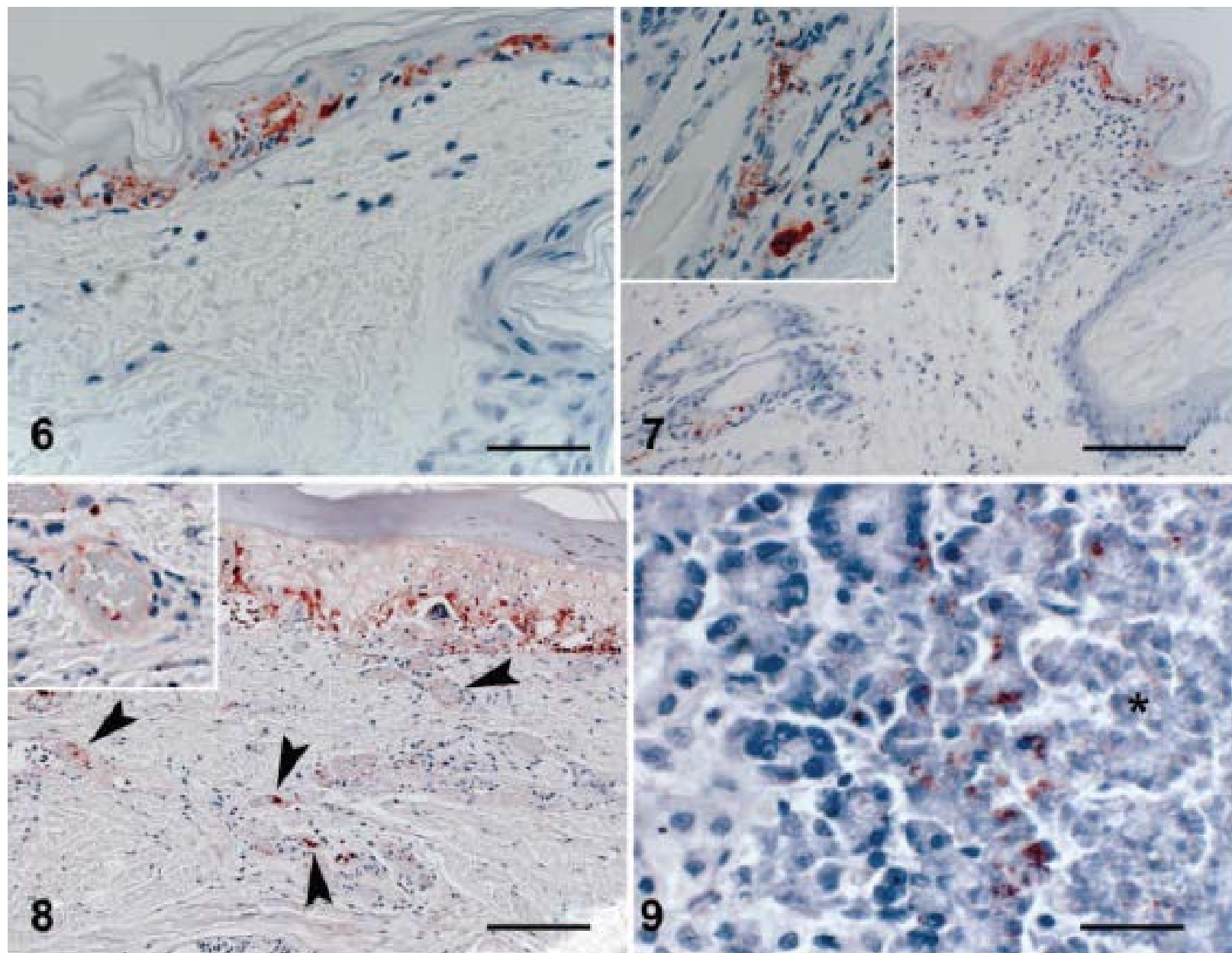
- Acutely affected (< 4 days of signs) & exposed cats
- Prior to treatment
- Sample most affected site
- Enough to reflect larger population
 - 10–30% of the population, min of 5 cats



Necropsy

- Can directly identify presence & *role* of pathogens
- Fresh, unfixed tissue submitted for PCR & culture/isolation
 - Obtain first before contamination
 - Refrigerate for bacteria, freeze for viruses
 - URT & lung samples
- Histopathology samples
 - Formalin (10:1, formalin:tissue)
 - Nasal sinus, trachea, lung, heart, hilar or thoracic inlet LNs
 - GI, liver, kidney, spleen if systemic disease





How Virulent Is It?

It is much more common to diagnose panleukopenia with calicivirus or another respiratory pathogen compared to VS-Calici during a URI outbreak w/ high mortality



Treatment of Acute URI



Treatment

Isolation

Supportive Care

- Nursing Care
- Hydration
- Promote appetite
- Analgesia
- NSAIDs
- Lysine

Minimize Stress

Antibiotics

Antivirals

Ophthalmic
Treatment



Isolation

- Importance of prompt recognition
- Ideally, separate ward
- In-cage isolation is ok if fomite transmission is considered at all times & cat is not on antibiotics
 - Do not house kittens in same room
 - Place signage
 - Partial cage cover
 - Spot clean
 - Handle last



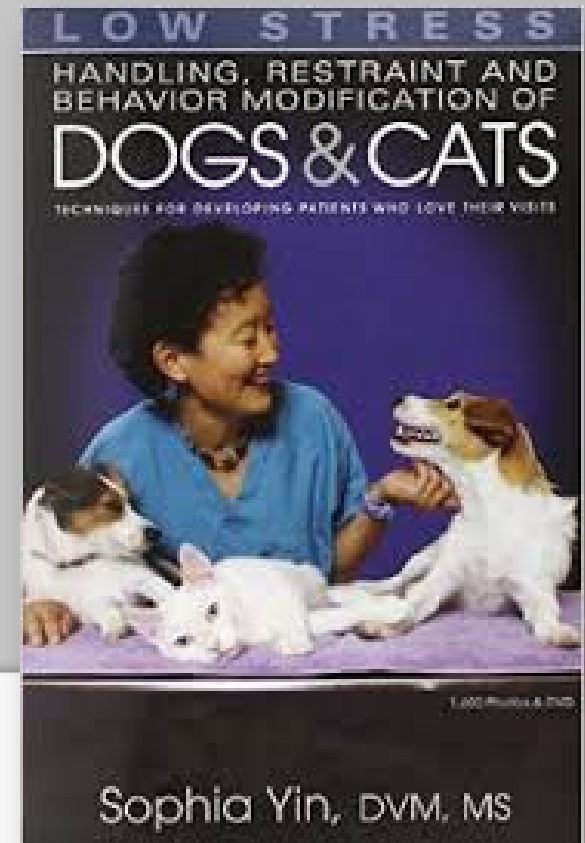
Minimize Stress

- Hide box
- Fresh air
- Conservative disinfectant use → spot clean
- Minimize noise
- Separate from dogs



Nursing Care

- Keep them comfortable, clean, nourished, & warm
 - Clear discharge
 - Hand feed
 - Provide soft bedding
- Low stress
 - Familiar routine
 - Familiar caregiver



Hydration

- Makes secretions less viscous
- Helps mucociliary apparatus function
- Reduces invasion of secondary pathogens
- Low stress
 - Warm fluids
 - Do not have to move the cat



Estimating Percent Dehydration

% dehydration	skin tenting	dry, tacky gums	sunken eyes
5-6	mild	none/mild	no
7-8	moderate	mild/moderate	no
9-10	severe	Severe	yes

Promote Appetite

– Wet foods

- Hand-feed
- Warm, smelly, soft foods
- Baby foods without onion/garlic powder
- Add in chicken broth or tuna juice
- Remove if cat is averse
- Place away from litter box

– Appetite stimulant

- Mirtazapine 1.87mg PO q 48h (smaller, more freq dose)
- Do not give Cyproheptadine with Mirtazapine



Minimize Discomfort

- Analgesia
 - If oral or corneal ulcers are present
 - IV, IM, or OTM buprenorphine
 - NSAIDs
 - Meloxicam dose once
 - In euhydrated patients



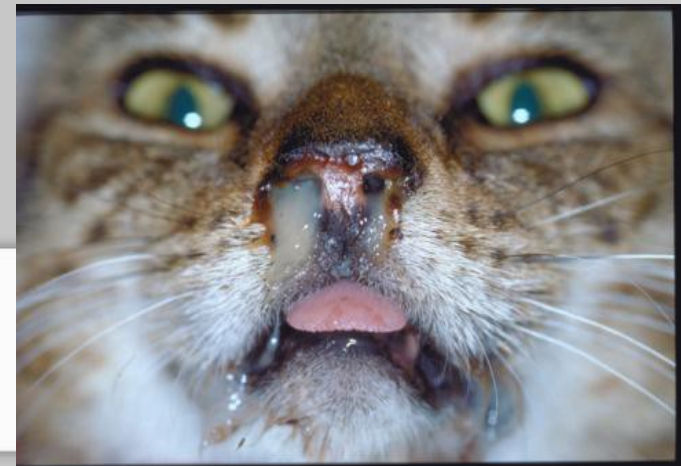
Lysine

- Competitive inhibitor of arginine → theoretically decreases replication of herpesvirus
- Ineffective as preventative in shelter trials
- Likely needs to be BID bolus (not ad lib w/ food) → which is likely stressful to cats
- Can try in client-owned or foster cats



Antibiotic Therapy Considerations

- Antibiotic use is shelter & animal dependent
- Downsides to treatment – adverse effects, stress, cost, antibiotic resistance
- Conservative treatment is best
- If all cats progress to signs of bacterial infection, then start antibiotic tx early BUT reassess:
 - Stress control
 - Air quality
 - Crowding



Treating Bacterial Infections

Doxycycline 10mg/kg PO SID x 7-10 d

→ most commonly used first line

- Effective against *Chlamydia*, *Bordetella*, & *Mycoplasma*
- Good airway + ocular penetration
- Safe in kittens
- Follow w/ fluid bolus if tablets used



Second Line Antibiotic Therapy

- If no response by $\sim 5-7$ d, consider
 - Switching for broader coverage against pathogens

Shelter URI is viral-driven in which secondary pathogens & *Mycoplasma* play a more frequent role than *Bordetella* or *Chlamydia*

→ Alternatives to consider switching to or adding on: fluoroquinolones, beta lactams



Ophthalmic Therapy

- Antibiotics

- For mild disease → Doxycycline (effective ocular penetration)
- For severe disease → Add in topical
 - Broad spectrum that's also effective against *Chlamydia* (tetracycline or erythromycin)
 - Avoid triple AB in cats
 - Can be irritating, monitor closely
 - Topical mucinomimetic for depleted goblet cells



- Antivirals

- Reserve for refractory herpes cases
- Topical 0.5% Cidofovir BID
- Systemic Famciclovir 40mg/kg PO TID



Treatment- monitoring

- Record daily signs
 - Attitude
 - Appetite
 - Clinical signs
 - Elimination
- Ensure initializing!

Yolo County Animal Services
Shelter Animal Medication/Treatment Card

Available for Adoption? (1) YES NO PENDING EVALUATION

Animal ID# (2) Location: (3)

Animal Description: (4)

Problem//Diagnosis: (5) Tech/DVM Initials: (6)

Rx#1: (7) Dose: (8) Route: (9) Frequency: (10)

Rx#2: Dose: Route: Frequency:

Rx#3: Dose: Route: Frequency:

Other Treatment: (11)

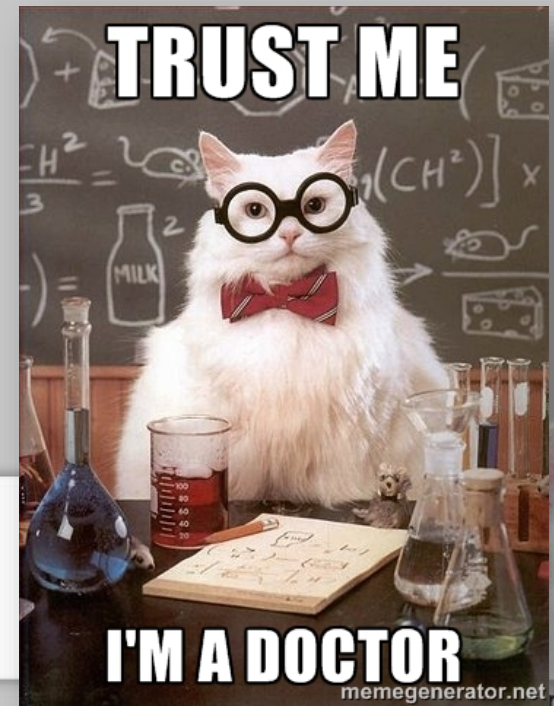
Rechecks: (12) Daily OR On: (13) And: (14)

Please fill in dates and highlight days/times medications are due on treatment record below

Day	Date	Rx #1		Rx #2		Rx #3		Daily Notes	Recheck
		AM	PM	AM	PM	AM	PM		
1	(15)	(16)					(17)	(18)	
2	(19)								
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

Treatment Course

- Discontinue treatment once signs resolve
 - Consistent monitoring imperative
- Move back to adoptions once signs resolve
 - Significantly reduced shedding



Treatment of Chronic URI



If signs are not resolving, consider:

Population problem:

- Flow issues
- Ventilation
- Treatment noncompliance
- Different pathogen

Individual problem:

- *Chlamydia* infection
- Nasopharyngeal polyps
- Dental disease
- Fungal infection
- Neoplasia
- Foreign body



Chronic URI Response

- Initiate after two treatment failures:
- Careful physical exam
- Test for retroviral disease
- Diagnostics
- Treatment trial
- Foster or adopt w/ disclosures → do not keep in isolation limbo!



Chlamydia Treatment

- Signs
 - Conjunctivitis/chemosis +/- resp signs
 - Ocular discharge (serous/unilateral → mucopurulent/bilateral)
 - Corneal ulceration uncommon
- Responds to treatment within 7 d but recurs in 14-30 d
- PCR if relapse occurs
- Treat w/ doxycycline for 28 d or 14 d past clinical resolution
- Foster to adopt candidate
- Reassess environmental factors



Chronic URI Therapy

- Antibiotics:
 - If initially responds, tx for 6-8 weeks & don't switch antibiotics
 - Clindamycin, Clavamox, Chloramphenicol, Azithromycin*
- Systemic antivirals for severe & persistent herpes signs
 - Famciclovir 40mg/kg PO TID for 2-3 weeks
- Intermittent nasal flushing
- Prednisone (if evidence of lymphocytic-plasmacytic disease)
- Intranasal vaccine (FVRC)
- Nasal decongestant drops
- Anti-inflammatories



Fostering

- Okay for:
 - Run-of-the-mill URI cases
 - Herpesvirus → low risk to pet cats who are vax & aren't stressed
- Not for suspect severe calicivirus
- Keep pet cats safe:
 - Revaccinate w/ intranasal FVRC +/- bivalent calicivax



Antiviral Use in Shelters

- Single dose of famciclovir in shelter at intake* did not limit development of URI signs or reduce herpes shedding
 - Further studies needed to look at timing, dosage, duration
- Antiviral drug-resistant strains of herpes have been described → restrict use



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Questions?!

Thank you!

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