

**Antimicrobial use guidelines
for treatment of respiratory
tract disease in dogs and cats**

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International Society for Companion
Animal Infectious Diseases (ISCAID)

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www.iscaid.org



**International Society for Companion
Animal Infectious Diseases (ISCAID)**

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Journal of Veterinary Internal Medicine 
Open Access

Guideline and Recommendation
J Vet Intern Med 2017

**Antimicrobial use Guidelines for Treatment of Respiratory Tract
Disease in Dogs and Cats: Antimicrobial Guidelines Working Group
of the International Society for Companion Animal Infectious
Diseases**

M.R. Lappin, J. Blondeau, D. Booth, E.B. Breitschwerdt, L. Guardabassi, D.H. Lloyd, M.G. Papich,
S.C. Rankin, J.E. Sykes, J. Turnidge, and J.S. Weese

Respiratory tract disease can be associated with primary or secondary bacterial infections in dogs and cats and is a common reason for use and potential misuse, overuse, and overuse of antimicrobials. There is a lack of comprehensive treatment guidelines such as those that are available for human medicine. Accordingly, the International Society for Companion Animal Infectious Diseases convened a Working Group of clinical microbiologists, pharmacologists, and internists to share experiences, examine scientific data, review clinical trials, and develop these guidelines to assist veterinarians in making antimicrobial treatment choices for use in the management of bacterial respiratory diseases in dogs and cats.

Key words: Bronchitis; Pneumonia; Pyothorax; Rhinitis.

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Lappin Objectives for the Lecture

- Share how ISCAID produces their guidelines
- Discuss the major categories of bacterial respiratory diseases in dogs or cats using case examples
- Justify our current core recommendations for the 5 major clinical syndromes
- Solicit YOUR help in making the NEW VERSION (2024)




Photo Credit: Michael Lappin

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Activity Title	Development and use of the International Society for Companion Animal Infectious Diseases (ISCAID) respiratory treatment guidelines
Knowledge based Learning Objectives Pharmacists (3 per hour of presentation)	1. To explain how the ISCAID respiratory guidelines were developed.
	2. To translate the drug choices for respiratory syndrome in animals.
	3. To describe the primary and secondary drug choices by respiratory syndrome in animals.
Knowledge based Learning Objectives Pharmacy Technicians (3 per hour of presentation)	1. To recognize how pharmacologists, internists, and bacteriologists work together to make clinical guidelines.
	2. To arrange drug choices by respiratory syndrome in animals.
	3. To list one primary and one secondary drug choice by respiratory syndrome in animals.

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<h2 style="text-align: center;">ISCAID Respiratory Guidelines</h2> <ul style="list-style-type: none"> • Committee members: Drs. Joseph Blondeau; Dawn Boothe; Ed Breitschwerdt; Luca Guardabassi; Michael Lappin; David Lloyd; Mark Papich; Shelly Rankin; Jane Sykes; John Turnidge; Scott Weese • Outside reviewers Drs. Leah Cohn, Joshua Daniels, Eleanor Hawkins, Steve Holloway, Lynelle Johnson, and Carol Reneiro

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<h3 style="text-align: center;">Guidelines rating</h3> <p>A draft document was developed over several years and an attempt to reach 100% agreement on each recommendation</p> <p>100% agreement was not always reached and so the committee employed a modified Delphi rating system on the final draft.</p> <p>Each guideline committee members and the outside reviewers were asked to independently select whether they agreed, were neutral, or disagreed with each recommendation."</p> <p>For those recommendations that received any "disagree" votes from the 17 total reviewers (Working Group and outside reviewers), the percentage distribution of all reviewers and appropriate comments are presented.</p>
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<h3 style="text-align: center;">Bacterial Respiratory Infections</h3> <ul style="list-style-type: none"> • Feline upper respiratory tract disease – Acute and chronic • Canine infectious respiratory disease complex • Bronchitis • Pneumonia • Pyothorax <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Overall 40 recommendations</p> <p>14 recommendations had 1 -3 disagree votes with comments</p> </div>
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Bacterial Respiratory Infections

- **Summary of Recommendations**
 - **Diagnosis of the syndrome**
 - Emphasis on documenting a bacterial (and less commonly protozoal) infection exists
 - **Treatment of the syndrome**
 - **Monitoring treatment**

Table 1. First line drugs
Table 2. All drugs and doses with comment

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Table 1. First line anti-microbial options for treatment of bacterial respiratory infections in dogs and cats

Infection Type	First-Line Drug Options
Acute bacterial upper respiratory infection (URI) in cats	Doxycycline ^a or amoxicillin per os (PO)
Chronic bacterial URI in cats	Doxycycline or amoxicillin PO Base the choice on CAS ^b if available
Canine infectious respiratory disease complex (bacterial component)	Doxycycline ^a or amoxicillin-clavulanate PO
Bacterial bronchitis (dogs or cats)	Doxycycline ^a PO Base changes if needed on clinical responses and CAS if available
Pneumonia in animals with extensive contact with other animals that have no systemic manifestations of disease (ie, fever, lethargy, dehydration)	Doxycycline ^a PO Base changes if needed on clinical responses and CAS if available
Pneumonia with or without clinical evidence of sepsis ^c	Parenteral administration of a fluoroquinolone ^d and a penicillin or clindamycin ^e initially Base oral drug choices to follow on clinical responses and CAS results if available
Pyothorax (dogs or cats) ^f	Parenteral administration of a fluoroquinolone ^d and a penicillin or clindamycin ^e initially combined with therapeutic lavage initially Base oral drug choices to follow on clinical responses and CAS results if available

<https://www.iscaid.org/guidelines>

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Feline Upper Respiratory Disease

- “Syndrome consisting of clinical signs that may include serous to mucopurulent ocular and nasal discharges, epistaxis, sneezing, and conjunctivitis.”
 - Acute (≤ 10 days)
 - Chronic (> 10 days)
- The term “upper respiratory infection (URI)” is reserved for cats with clinical signs of URTD that are directly associated with one or more of the known pathogenic viral, bacterial, or fungal organisms.

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Acute Feline URI

- **Primary bacterial infections**
 - *Bordetella bronchiseptica*
 - *Chlamydia felis*
 - *Mycoplasma* spp.
 - *Bartonella* spp. in cats???? – Probably not
 - Some *Pasteurella* spp.
 - Some *Streptococcus* spp.
- **Secondary bacterial infections**
 - *Pasteurella*
 - *Staphylococcus*
 - *Streptococcus*
 - Anaerobes

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Secondary Bacterial Rhinitis

- Viral
 - FHV-1, FCV, influenza viruses, SARS-CoV-2
- Fungal
- Otitis media/polyps (cats)
- Anatomical
- Neoplasia
- Foreign bodies
- Oronasal fistulas
- Allergic
- Trauma

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Diagnostic Plan- Acute Rhinitis Phase 1

- Cytology – Not needed to predict antibiotic choices
- CBC, FeLV/FIV
- Culture – Hard to interpret
- PCR – Hard to interpret
- *Cryptococcus* serum antigen titer
- Coagulation tests
 - Epistaxis cases
- Blood pressure
 - Epistaxis cases
- Therapeutic trials

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Problems with Feline Herpesvirus-1, Calicivirus,
Chlamydia, *Mycoplasma* and *Bordetella* PCR !

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- **Healthy carrier cats**
 - Feline herpesvirus 1*
 - **Conjunctivitis**
 - 221 cats-13.7% positive
 - **Normal cats**
 - 84 cats- 30.9% positive
 - Calicivirus*
 - *Mycoplasma*
 - *Bordetella**
- **Negative does not rule out infection**
- ***Bordetella* should have culture!**
 - AB susceptibility optimal
- ***Mycoplasma***
 - Multiple pathogens
- ***Chlamydia felis****
 - Rare in pet cats

Feline
Respiratory PCR
assays

*Vaccine effects?

Burgesser et al, J Vet Diag
Invest 1999;11:122-126.

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Key Points

- FHV-1 PCR result predicting cidofovir treatment response
 - PPV = 29.4% NPV = 60%
- *Mycoplasma* PCR result predicting tetracycline treatment response
 - PPV = 40% NPV = 38.5%
- Trying to predict conjunctivitis treatment response with PCR panel results is approximately as accurate as flipping a coin

Topics in Companion An Med 13 (2018) 45–48

Research article

Feline Herpesvirus 1 and *Mycoplasma* spp. Conventional PCR Assay Results From Conjunctival Samples From Cats in Shelters With Suspected Acute Ocular Infections



Dara Zirofsky^{1,2}, Wendy Rekers^{3,2}, Cynthia Powell⁴, Jennifer Hawley⁴, Julia Veir⁴, Michael Lappin^{5,6}

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ISCAID Recommendation

“The Working Group recommends that antimicrobial therapy be considered within the 10-day observation period only if fever, lethargy, or anorexia are present concurrently with mucopurulent nasal discharge”

• 2017

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- **First choices**
 - Doxycycline
 - Amoxicillin
- **Rescue drugs**
 - Fluoroquinolones
 - Azithromycin
 - Cephalosporins
 - Potentiated penicillins

Bacterial Rhinitis

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Journal of Veterinary Internal Medicine Open Access

Guideline and Recommendation

1710-1716 (2017)

Antimicrobial use Guidelines for Treatment of Respiratory Tract Disease in Dogs and Cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases

M.R. Lappin, J. Blotkou, D. Booth, E.B. Breitschwendt, I. Guardabassi, D.H. Lloyd, M.G. Papich, S.C. Rankin, J.E. Sikes, J. Tarralde, and J.S. Weese

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Acute Feline Bacterial URI First line treatment

- **Doxycycline**
 - All primary pathogens
 - *Bordetella bronchiseptica*
 - *Mycoplasma felis*
 - *Chlamydia felis*
 - *Bartonella* spp. ??
 - Anti-inflammatory (but we cannot say it in a guideline)
 - Labeled for 4 weeks of age in some countries
 - Once daily
 - 10 mg/kg, PO X 7–10 days OR
 - 5 mg/kg, PO, q12 hours for 7 – 10 days

Minocycline dose

8.8 mg/kg, PO, once daily
(50 mg/cat)

Pharmacokinetics of minocycline in domestic cats.
Tynan BE¹, Papich MG², Kerl ME¹, Cohen LA³. J Fel Med Surg 2016

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Conclusions and relevance Because most bacteria will have a minimum inhibitory concentration of ≤ 0.5 $\mu\text{g/ml}$, an oral dose of 8.8 mg/kg q24h would be adequate to meet pharmacokinetic-pharmacodynamic targets after adjusting for protein binding. Although some gastrointestinal upset may occur, one 50 mg capsule orally q24h would provide appropriate dosing for most cats.

50 mg capsule/cat, PO, q24 hours

Original Article



Pharmacokinetics of minocycline in domestic cats

Beth E Tynan¹, Mark G Papich², Marie E Kerl¹ and Leah A Cohn¹

fms
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2016, Vol. 16(4) 207-209
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DOI: 10.1177/1098612315579114
fms.com
SAGE

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Doxycycline (all pills/capsules?)

- Formulate to 50 mg/ml
 - Tuna suspension the favorite!
 - 10 mg/kg, PO, once daily
 - 40 mg (0.8 ml) per standard cat!
- Give 2 ml water after pilling
- Coat with butter or vitamin
- Pill treats
- Flavor pill guide

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A comparative study evaluating the esophageal transit time of eight healthy cats when pilled with the FlavoRx pill glide versus pill delivery treats

Alexander D Bennett BS¹, Catriona M MacPhail DVM, PhD, Diplomate ACVIM^{1*},
Debra S Gibbons DVM, MS, DACVP², Michael R Lappin DVM, PhD, Diplomate ACVIM¹

¹Department of Clinical Sciences, Colorado State University, Fort Collins, Colorado State University, USA

²Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, Colorado State University, USA

Retention of tablets or capsules in the feline esophagus can be associated with esophagitis and esophageal stricture formation. The objective of this study was to evaluate the esophageal passage of tablets and capsules when administered with either a one-step pill gun with flavored liquid (FlavoRx pill glide) or a pill delivery treat (Pill Pockets). Four different medication administrations were evaluated on different days in eight normal cats: tablets with FlavoRx pill glide (T-FG), tablets with pill delivery treats (T-PD), capsules with FlavoRx pill glide (C-FG) and capsules with pill delivery treats (C-PD). The estimated average transit time was 36 s for T-FG, 60 s for T-PD, 16 s for C-FG, and 24 s for C-PD. The results of this study suggest that either pill delivery method is acceptable for successful passage of tablets or capsules into the stomach of cats using a single replicate.

Date accepted: 29 September 2009

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2 ml of water will help pills and capsules go straight to the stomach!

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Bacterial Rhinitis

- **Amoxicillin**
 - *Pasteurella*, *Staph*, *Strep*, *Anaerobes*
- **Amoxicillin-clavulanate**
 - *Pasteurella*, *Staph*, *Strep*, *Anaerobes*
 - *B. bronchiseptica*
 - *Chlamydia felis* (inferior to doxycycline)
 - Some gram negatives
- **Cefovecin**

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What about cefovecin for feline URI?

“oral administration of amoxicillin-clavulanate or doxycycline appeared to be more effective than a single SC injection of cefovecin”

Comparison of the efficacy of amoxicillin-clavulanic acid, cefovecin, and doxycycline in the treatment of upper respiratory tract disease in cats housed in an animal shelter

Antonia L. Litwin, BVSc, MS, MScPhD, Chang-Chang Wu, DVM, MS, Peter D. Constantopoulos, BVSc, MS, DACVIM

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Topics in Companion Animal Medicine 32 (2017) 104-108

Topical Review

Effect of *Enterococcus Faecium* Strain SF68 on Gastrointestinal Signs and Fecal Microbiome in Cats Administered Amoxicillin-Clavulanate



C. Torres-Henderson ^a, S. Summers ^a, J. Suchodolski ^b, M.R. Lappin ^{a*}



CENTER FOR COMPANION
ANIMAL STUDIES
COLORADO STATE UNIVERSITY

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Materials and Methods

- **Double blinded, placebo controlled**
 - Stool character, appetite, attitude, vomiting
 - Assessed daily by masked individuals
- **Treatment protocol**
 - SF68 at 6 am for treatment cats
 - Amoxicillin-clavulanate at 8 am and 6 pm all cats
- **Periods**
 - 10 days for equilibration (cats prone to stress diarrhea excluded)
 - 7 days AB treatment
 - 14 days SF68 treatment
- **During AB treatment and then for 7 days**

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- 12 of 14 placebo cats > 5 at least once
 - 11 of 13 SF68 cats > 5 at least once

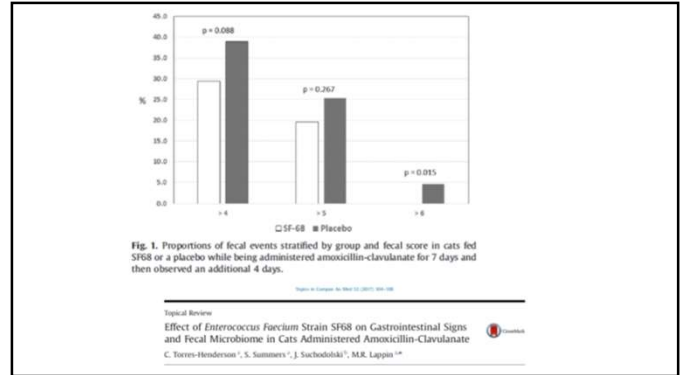
Amoxicillin/clavulanate causes diarrhea!

Score 1 Score 2 Score 3
 Score 4 Score 5 Score 6 Score 7

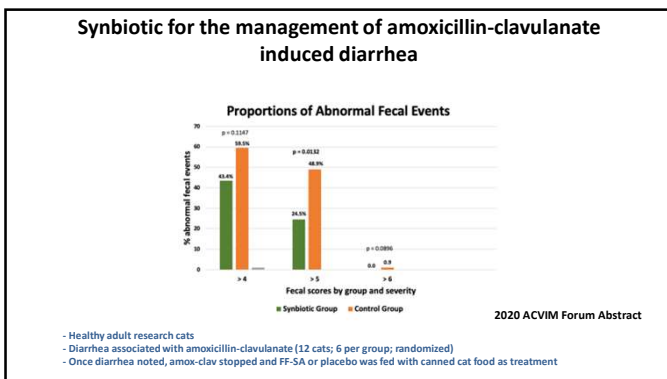
<https://www.purina.institute.com/sites/default/files/2021-04/fecal-chart.pdf>

May need probiotic supplement prior to antibiotic dosing

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Treatment Plan Summary

- **Acute, first time URI in cats**
 - Supportive care is generally all that is required
 - Fluids
 - Canned food
 - Nebulization
 - Pain medication if concurrent stomatitis or glossitis
- **Recurrent or chronic URI in cats**
 - Phase 2 diagnostics indicated
 - Polyp, stricture, tooth root abscess, foreign body, neoplasia, fungal

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Diagnostic plan Chronic Feline URI

- Induce, intubate
 - Feel for polyp, oral exam
- Imaging
 - Skull radiographs
 - CT scan
 - MRI scan
- Probe teeth
- Rhinoscopy
- Nasal lavage
- Biopsy
 - Culture and/or lavage, brushings, or biopsies

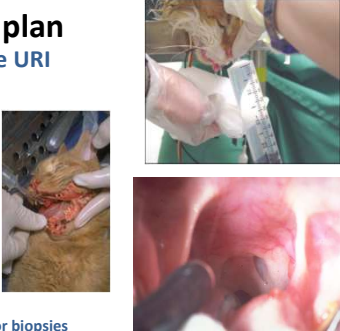


Photo Credits: Michael Lappin

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If a treatable cause of suspected chronic bacterial rhinitis is not found additional antibiotics, may be indicated




Photo Credits: Michael Lappin

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Chronic Feline Bacterial URI

- Primary therapy
 - Doxycycline
- Rescue therapy
 - Veterinary fluoroquinolone
 - Azithromycin
 - Beta lactam
 - Cefovecin and amoxicillin-clavulanate most common
 - Clindamycin
- Monitoring – generally clinical signs

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Bacterial Rhinitis

- Quinolones
 - Gram negatives
 - *Mycoplasma* spp.
 - Some gram positives
 - Poor anaerobic effect
 - Except pradofloxacin
 - Resistant infections only

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Evaluation of pradofloxacin for the treatment of feline rhinitis

Miranda E Spindel DVM, MS¹, Julia K Veir DVM, PhD, DACVIM, Steven V Radecki PhD, Michael R Lappin DVM, PhD, DACVIM

¹Department of Clinical Sciences, Colorado State University, 300 West Drake, Fort Collins, CO, United States

Forty humane society cats with suspected bacterial upper respiratory infections (URIs) were studied in order to compare amoxicillin and pradofloxacin for treatment of rhinitis and describe common pathogens. Nasal discharges were collected prior to random placement into one of these treatment groups. Cats failing to initially respond were crossed to the alternate drug. Drug toxicity was not noted. The organisms most frequently isolated on amplified pre-treatment were feline herpesvirus-1 (75%), *Mycoplasma* species (62.5%), *Bordetella* species (47.5%), *Staphylococcus* species (22.5%) and *Streptococcus* species (10.0%). No differences in clinical scores between groups over time were noted. Overall response rates for amoxicillin at 22 mg/kg, q12h for seven doses (10/15 cats 67%), pradofloxacin at 5 mg/kg, q24h for seven doses (11/13 cats 85%), and pradofloxacin at 10 mg/kg, q24h for seven doses (11/12 cats 92%) were not statistically significant. Results suggest that pradofloxacin can be a safe, efficacious therapy for some cats with suspected bacterial URI.

Date accepted: 21 April 2008

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Approved for cats only in USA
- Skin and soft tissue claim
Respiratory claim in some countries

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Bind to DNA gyrase Binds to topoisomerase IV Two targets = enhanced spectrum

4-quadrant
Oral drug

Pradofloxacin: A novel veterinary fluoroquinolone for treatment of bacterial infections in cats

Jane E. Sykes^{1,2}, Joseph M. Biondeau³

¹Department of Medicine and Epidemiology, 2108 Tupper Hall, University of California, Davis, Davis, CA 95616, USA

²Departments of Pathology and Laboratory Medicine, Microbiology and Immunology and Ophthalmology, Royal University Hospital, Saskatoon Health Region and University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W5, Canada

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- Only quinolone to kill anaerobes
- 100% ocular safety
- Labeled in USA for skin/soft tissue
 - Great for resistant bacteria
 - Great for atypical *Mycobacterium*
- Off label uses
 - *Bartonella henselae*
 - Hemoplasmas
 - Gingivitis stomatitis
 - Systemic infections
 - Upper and lower respiratory

Feline
Pradofloxacin
Facts

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- Spectrum
 - Gram +, anaerobes, *Mycoplasma*, *Bordetella*, some other gram -, and possibly *T. gondii*
- Rhinitis
 - 5 - 10 mg/kg, PO, q12 hour day 1
 - Then q72hr
- Reconstitute q 10 days

Azithromycin

Journal of Feline Medicine and Surgery (2009) 19, 342-350
doi:10.1016/j.jfms.2009.04.002



jfms

Efficacy of amoxicillin and azithromycin for the empirical treatment of shelter cats with suspected bacterial upper respiratory infections

Rebecca A Ruch-Gallie DVM, MS¹, Julia K Veir DVM, PhD, Diplomate ACVIM, Miranda E Spindel DVM, Michael R Lappin DVM, PhD, Diplomate ACVIM

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ISCAID Recommendation

“Aerobic bacterial culture and antimicrobial susceptibility testing, *Mycoplasma* spp. culture (or PCR assay), and molecular diagnostic procedures for canine parainfluenza virus, canine adenovirus 2, canine distemper virus, canine respiratory coronavirus, canine influenza viruses, canine herpesvirus, pneumovirus, *B. bronchiseptica*, and *Mycoplasma* spp. (or *M. cynos* alone) can be performed in dogs with CIRDS”

“However, each of these organisms can be grown or detected using molecular methods from healthy and diseased dogs and vaccine strains of the organisms can be amplified using molecular diagnostic assays.⁶² Molecular assays may also be of limited sensitivity by the time dogs are presented for examination since viral shedding rates tend to peak very early in disease”

“Thus, these tests are generally not recommended by the Working Group for single cases with typical clinical presentations, no evidence of pneumonia, and when high risk populations (e.g. breeding kennels) are not involved”

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ISCAID Recommendation

“If bacterial CIRDC is suspected in dogs with mucopurulent nasal discharge, fever, lethargy, or inappetence but no clinical evidence of pneumonia (e.g., crackles or wheezes on thoracic auscultation), the Working Group recommends administration of doxycycline empirically for 7 – 10 days as the first line antimicrobial option”

“Of the 17 reviewers, 15 (88.2%) agreed with this recommendation and 2 disagreed. One reviewer stated that if there is no evidence of pneumonia and the case is not at high risk for pneumonia (brachycephalic, collapsing airways; immunosuppressed), antimicrobial therapy is not indicated at all. The other dissenting reviewer disagreed with the recommendation because there is no breakpoint data for doxycycline for *B. bronchiseptica* or *Mycoplasma* spp. in dogs and so whether the agents are truly susceptible to the drug is unknown”

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Table 1. First line anti-microbial options for treatment of bacterial respiratory infections in dogs and cats

Infection Type	First-Line Drug Options
Acute bacterial upper respiratory infection (URI) in cats	Doxycycline ^a or amoxicillin per os (PO)
Chronic bacterial URI in cats	Doxycycline or amoxicillin PO Base the choice on C&S ^b if available
Canine infectious respiratory disease complex (bacterial component)	Doxycycline ^a or amoxicillin-clavulanate PO
Bacterial bronchitis (dogs or cats)	Doxycycline ^a PO Base changes if needed on clinical responses and C&S if available
Pneumonia in animals with extensive contact with other animals that have no systemic manifestations of disease (i.e. fever, lethargy, dehydration)	Doxycycline ^a PO Base changes if needed on clinical responses and C&S if available
Pneumonia with or without clinical evidence of sepsis ^c	Parenteral administration of a fluoroquinolone ^d and a penicillin or clindamycin ^e initially Base oral drug choices to follow on clinical responses and C&S results if available
Pyothorax (dogs or cats) ^b	Parenteral administration of a fluoroquinolone ^d and a penicillin or clindamycin ^e initially combined with therapeutic lavage initially Base oral drug choices to follow on clinical responses and C&S results if available

<https://www.iscaid.org/guidelines>

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ISCAID Recommendation

“If clinical findings in dogs or cats with pneumonia suggest the existence of sepsis (e.g. injected mucous membranes, hypoglycemia), the Working Group recommends concurrent parenteral administration of either enrofloxacin or marbofloxacin (available in injectable form in some countries) combined with a drug with gram-positive and anaerobic spectra until bacterial culture and antimicrobial susceptibility testing results return”

Use of other drugs with gram – activity that are discussed include aminoglycosides, third generation cephalosporins, carbapenems, ticarcillin/clavulanate, and piperacillin-tazobactam

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ISCAID Recommendation

“The Working Group states that common options for gram-positive and anaerobic bacteria include ampicillin or clindamycin administered parenterally. Which of these drugs to choose while waiting on antimicrobial susceptibility test results will depend on the most likely infectious agent suspected, previously prescribed antimicrobials (if any), and historical antimicrobial resistance in the geographical region”

“Fourteen reviewers (82.4%) agreed and three (17.9%) disagreed with this Working Group recommendation. The primary comment was that if *Bacteriodes* spp. were present, clindamycin could be ineffective and that metronidazole could be considered another option.”

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ISCAID Recommendation

“It is the consensus opinion of the Working Group that shorter courses of appropriate treatment, such as those used to treat pneumonia in humans, might be effective in some situations”

“In the face of insufficient data supporting a shorter course of therapy, the Working Group recommends re-evaluation of animals with pneumonia no later than 10 to 14 days after starting treatment”

“At that point, decisions to extend therapy should be based on clinical, hematological and radiographic findings”

“Additional studies evaluating durations of treatment that are shorter than 4 to 6 weeks are required”

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<https://www.iscaid.org/guidelines>

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Conclusions

The Working Group emphasizes the need for additional prospective studies evaluating different treatments and treatment durations in dogs and cats with bacterial respiratory diseases so that more accurate recommendations can be made.

For the same purpose, research is needed in order to develop standard practices for collection of clinical specimens and interpretation of culture results.

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Assessment 1

How were the International Society for Companion Animal Infectious Disease (ISCAID) respiratory treatment guidelines developed?

- A. One Veterinary College submitted their protocol to be adopted by the ISCAID organization.
- B. Several experts from around the world engaged the Delphi method to come to consensus.**
- C. The ISCAID submitted a review article in a Veterinary journal and asked for feedback.
- D. A poll was sent to all the members of the organization for a one time response.

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Assessment 2

Clinical signs of an upper respiratory syndrome in cats may include:

- A. Serous ocular discharge
- B. Mucopurulent nasal discharge
- C. Sneezing
- D. All of the above**

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Assessment 3

Which is a first-line drug treatment choice for respiratory syndrome in cats with a chronic bacterial upper respiratory infection?

- A. Enrofloxacin
- B. Cefovecin
- C. Linezolid
- D. Doxycycline**

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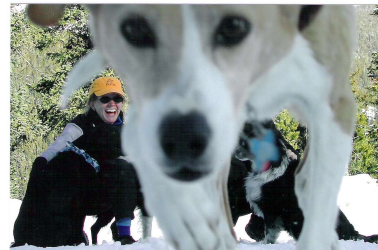


Photo Credit: Michael Lappin

Final Comments?
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Antimicrobial use Guidelines for Treatment of Respiratory Tract Disease in Dogs and Cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases

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Key words: Bronchitis; Pneumonia; Psychoses; Rhinitis

Lappin, M. R., Blondeau, J., Boothe, D., Breitschwerdt, E. B., Guardabassi, L., Lloyd, D. H., ... & Weese, J. S. (2017). Antimicrobial use guidelines for treatment of respiratory tract disease in dogs and cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases. *Journal of Veterinary Internal Medicine*, 31(2), 279-294. <https://doi.org/10.1111/jvim.14627>