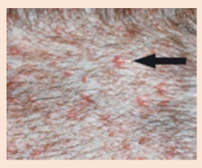
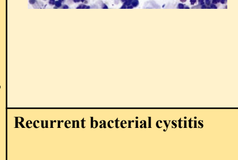
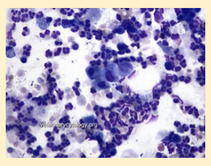
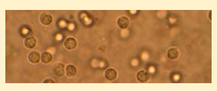
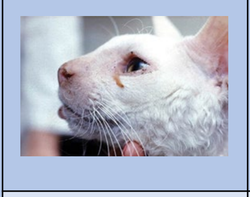
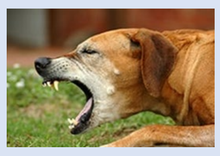
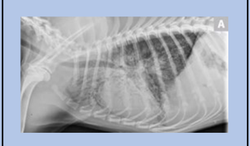
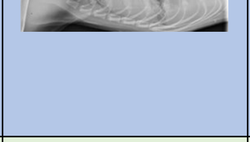
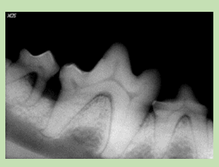
Judicious Antimicrobial Use Guidance for Common Companion Animal Conditions

	Condition	Diagnostics	Organisms	Antimicrobial Resistance and Stewardship Considerations	Therapy Best Practices	Therapy Guidance	Follow-up and Prevention	Other
Skin and Ears	**Canine superficial bacterial folliculitis (superficial pyoderma)** 	1) Cytology (Inflammatory cells and intracellular cocci from intact pustules confirms infection) 2) Check for underlying disease 3) +/- C&S (necessary for chronic or recurrent cases)	• *Staphylococcus pseudintermedius,* other *Staphylococcus* spp., *Streptococcus* spp. • Commonly polymicrobial with bacteria and yeast (*Malassezia pachydermatis)*	• *Staphylococcus* spp. – Methicillin resistance, multidrug resistance (MDR)	• Topical therapy alone should be effective • Avoid antimicrobials in topical treatments • Ensure underlying conditions (e.g., allergies, endocrine disorders, ectoparasites) are appropriately controlled to avoid recurrence • In moderate to severe cases, steroids or other immunosuppressive treatments may be needed to ensure patient comfort	Mild case (localized disease): Topical treatment with wipes/spray/lotion (hydroxyl acids, benzoyl peroxide, silver sulfadiazine) Moderate case (generalized disease): Bathe in cool water 1-3x per week for 2-4 weeks using 2-4% chlorhexidine digluconate, or sodium hypochlorite/salicylic acid Severe case: Topical treatment (bathe as for a moderate case) and an initial 7-day course of antimicrobials (listed in order of preference): 1) Cephalexin 15-30 mg/kg PO q12h 2) Amoxicillin-clavulanic acid 12.5-25 mg/kg PO q12h 3) Clindamycin 5.5 mg/kg PO q12h 4) Consider Trimethoprim-sulfonamide or a fluoroquinolone if a Gram-negative organism is present	• Reexamine the patient in 7 days to monitor progress (+/- cytology and C&S) and at expected resolution. • Educate owners on early signs of recurrence (pruritis, erythema, pustules) and advocate for early treatment.	• Direct and indirect transmission of *S. pseudintermedius* and *S. aureus* may occur between humans and pets in the same household • Common causes of chronicity or recurrence: Failure to identify and/or control the underlying condition, inappropriate therapy, lack of diagnostics, methicillin resistance, poor client compliance
	Abscess 	1) +/- Cytology (rule out unexpected causes) 2) C&S for chronicity or recurrence	• *Pasteurella* spp., *Staphylococcus* spp., *Streptococcus* spp., anaerobes • Commonly polymicrobial including normal skin/ oral and environmental bacteria	• Consider resistance for patients with a history of recent or recurrent antimicrobial use	• Abscess drainage is definitive therapy • Antimicrobials unnecessary unless systemic signs or moderate/severe cellulitis present	Antimicrobial recommendation when warranted - Use one of the following for 3-7 days (listed in order of preference): 1) Amoxicillin-clavulanic acid 12.5-20 mg/kg PO q12h 2) Clindamycin 5-33 mg/kg PO q12h 3) Trimethoprim-sulfonamide 15 mg/kg PO q12h	• Reexamine patient and remove drain in 2-3 days, or when drainage has significantly decreased • Instruct owner to inspect and clean the drain site multiple times a day; documenting progress with photos is helpful	• For fractious animals consider Cefovecin 8mg/kg SC once • Abscess causes: Bite wounds, puncture wounds, foreign bodies, iatrogenic Flush options: • Sterile saline recommended as the most tissue friendly flush • Chlorhexidine solution 0.05% recommended for severe cases
	Otitis externa 	1) Cytology 2) +/- C&S (Recommended for: Otitis media, suspected resistant bacteria, rods, history of chronic or recurrent otitis)	• *Staphylococcus pseudintermedius,* other *Staphylococcus* spp., *Pseudomonas* spp., *Streptococcus* spp., *Corynebacterium auriscanis* • Commonly polymicrobial including normal skin flora and yeast (*Malassezia pachydermatis)*	• *Staphylococcus* spp. - Methicillin resistant, MDR • *Pseudomonas* – Intrinsic resistance, 3rd generation cephalosporin resistance, carbapenem resistance, MDR • Antimicrobial resistance more likely in recurrent and chronic otitis externa cases	• Topical treatment of infection and inflammation is essential • Systemic antimicrobials rarely needed for otitis externa • Consider systemic anti-inflammatory and antimicrobial therapy for severe cases • Ensure underlying conditions (e.g., allergies, endocrine disorders, ectoparasites) are controlled to avoid recurrence • Check tympanic membrane integrity as some antimicrobials are ototoxic (aminoglycosides)	Topical treatment: • Topical preparations for 5-7 days or as directed on label • Otic cleansers 2-3 times weekly if needed	• Reexamine patient and repeat cytology in 10 days • Counsel owners to seek care for patient promptly if symptoms and signs recur to avoid chronic otitis Maintenance Therapy: • Long-term maintenance may include regular ear flushing by owners	• Contributing factors: Hypersensitivity disease (food allergy, atopic dermatitis), endocrine disease (hypothyroidism), immune mediated disease, patient factors (excessive hair, stenotic canals, increased cerumen production), middle ear infection, obstructive ear disease (inflammatory aural polyps, neoplasia, ceruminous gland cystomatosis, cholesteatoma), otic parasites
Urinary Tract	**Feline Idiopathic Cystitis (FIC)** 	1) Urine sediment exam with cytology and urinalysis (cystocentesis) 2) Aerobic urine C&S 3) Imaging –various modalities 4) +/- Biopsy of urinary bladder	• None	• Inappropriate antimicrobial use for this condition contributes to antimicrobial resistance in normal flora	• Antimicrobial drugs are not recommended • FIC is the most common diagnosis for Feline Lower Urinary Tract Disease (FLUTD), comprising 55-65% of FLUTD cases	Treatment recommendations (without obstruction): • Opioids or NSAIDs during acute episodes • Moist food and increased water intake • Reduce stress and increase environmental enrichment Treatment recommendations (with obstruction): • Urinary catheter placement • Surgical procedure (perineal urethrostomy)	• Reexamine patient in 7 days	• FIC, which is of unknown etiology, is the diagnosis by exclusion when no underlying cause can be found for FLUTD • 65% cats with acute FIC experience ≥1 recurrences within 12 months • Risk factors: Age 2- 6 years, neutered, obese, underlying disease, dry food, environmental stressors (anxiety, conflict with other cats)
	Sporadic bacterial cystitis 	1) Urine sediment exam with cytology and urinalysis (cystocentesis) 2) Aerobic urine C&S	• *Escherichia coli, Proteus* spp., *Klebsiella* spp., *Staphylococcus* spp., *Streptococcus* spp., *Enterococcus* spp.	• *Staphylococcus* spp. – Methicillin resistance, MDR • Enterobacterales (*E. coli, Proteus* spp., *Klebsiella* spp.) – 3rd generation cephalosporin resistance, carbapenem resistance, MDR • *Enterococcus* spp. – Intrinsic resistance, vancomycin resistance, MDR • If C&S indicates resistance to empirical antibiotic choice, the drug should be changed <u>unless</u> there has been a good clinical response	• Condition is common in dogs; occasional in cats • Treatment warranted for lower urinary tract disease signs with bacterial cystitis and positive C&S • Consider NSAID use (caution in cats) during initial treatment period to improve patient comfort.	Mild clinical signs: Consider pain management (NSAID), consider antimicrobials after 3-4 days if signs persist or worsen Moderate to severe clinical signs - Use one of the following for 3-5 days (listed in order of preference): 1) Amoxicillin 11-22 mg/kg PO q12h 2) Trimethoprim-sulfonamide 15-30 mg/kg PO q12h 3) Amoxicillin-clavulanic acid 12.5-25 mg/kg PO q12h If the patient has a compromised ability to concentrate urine it may impact antimicrobial concentration in the urinary bladder	• Reexamine patient in 7 days • Not recommended to repeat urinalysis and/or urine C&S if signs have resolved	• Fewer than 3 episodes of known or suspected bacterial cystitis in the prior 12 months should be treated as sporadic cystitis • Animals with 3 or more cases of clinical cystitis within the last 12 months and those with recurrent bacterial cystitis within a 3-month period should be managed as recurrent bacterial cystitis • Cat - Diagnosis should be confirmed with urine C&S in <u>all</u> cases due to low likelihood of bacterial cystitis in cats with FLUTD; FIC or urolithiasis are more common • Dog - Sporadic cystitis is rare in intact males so consider bacterial prostatitis
	Recurrent bacterial cystitis 	1) Urine sediment exam with cytology and urinalysis (via cystocentesis) 2) Aerobic urine C&S 3) Imaging – various modalities 4) +/- Biopsy of urinary bladder (C&S and histopathology)	• *E. coli, Proteus* spp., *Klebsiella* spp., *Staphylococcus* spp., *Streptococcus* spp., *Enterococcus* spp., *Pseudomonas aeruginosa*	• *Staphylococcus* spp. - Methicillin resistance, MDR • Enterobacterales (*E. coli, Proteus* spp., *Klebsiella* spp.) –3rd generation cephalosporin resistance, carbapenem resistance, MDR • *Enterococcus* spp. – Intrinsic resistance, vancomycin resistance, MDR • *Pseudomonas* spp. – Intrinsic resistance, 3rd generation cephalosporin resistance, carbapenem resistance, MDR • Antimicrobial resistance should be considered in these cases	• Recurrent cystitis is a result of relapsing or persistent infection, or reinfection • If the pathogen isolated from an animal with a recurrent infection is different from the previous organism, reinfection is likely, and identification and treatment of predisposing factors is strongly recommended • Consider NSAID use (caution in cats) during initial treatment period to improve patient comfort	Use one of the following for 3-5 days (listed in order of preference): 1) Amoxicillin 11-22 mg/kg PO q12h 2) Trimethoprim-sulfonamide 15-30 mg/kg PO q12h 3) Amoxicillin-clavulanic acid 12.5-25 mg/kg PO q12h • If the patient has a compromised ability to concentrate urine it may impact antimicrobial concentration in the urinary bladder • Consider a short antimicrobial course of 3-5 days for reinfection, and a longer course of 7-14 days for persistent and relapsing infections	• Reexamine patient in 7-10 days (or 5 days after completing antibiotics) • Approach bacteriuria without clinical signs post-treatment as subclinical bacteriuria • Microbiological cure (elimination of offending organism) is desirable but not necessarily achievable or required for short or long-term clinical resolution • If clinical signs persist or rapid re-infection occurs seek consultation or referral	• Animals with 3 or more cases of clinical cystitis within the last 12 months and those with recurrent bacterial cystitis within a 3-month period should be managed as recurrent bacterial cystitis. • Consider comorbidities: endocrinopathy, renal disease, obesity, abnormal vulvar conformation, congenital abnormalities of the urogenital tract, prostatic disease, bladder tumor, polypoid cystitis, urolithiasis, immunosuppressive therapy, rectal fistula, urinary incontinence/retention
	Subclinical bacteriuria 	• Urine C&S not recommended for animals without clinical signs of urinary tract disease	• *E. coli, Proteus* spp., *Klebsiella* spp., *Staphylococcus* spp., *Streptococcus* spp., *Enterococcus* spp., *Pseudomonas aeruginosa*	• Inappropriate antimicrobial use for this condition may contribute to antimicrobial resistance	• Antimicrobial treatment not recommended in absence of clinical signs of lower urinary tract disease even when cytological abnormalities are present • Isolation of a multidrug resistant bacterial species in the absence of signs should <u>not</u> affect the decision to treat (resistance genes are not virulence factors so are not more likely to cause disease) • C&S not recommended in absence of clinical signs	• None	• Recheck exam is not needed unless antibiotics are provided	• Subclinical bacteriuria in dogs and cats is not associated with an increased risk of developing bacterial cystitis • Bacterial cell count cannot differentiate subclinical bacteriuria from bacterial cystitis
Respiratory Tract	**Feline Upper Respiratory Tract Infection (URTI)** 	1) Ocular/oral/otic exam 2) Feline leukemia virus antigen and feline immunodeficiency virus antibody test	• 90% of feline URTI caused by viruses • Viral: feline herpesvirus type-1, calicivirus • Bacterial: *Bordetella bronchiseptica*, *Chlamydia* spp., *Mycoplasma* spp.	• Inappropriate antimicrobial use for this condition may contribute to antimicrobial resistance	• Most cats improve ≤10 days without antimicrobial treatment • Consider antimicrobial therapy if clinical signs persist for >10 days or signs of systemic illness or pneumonia develop • Collect culture prior to treatment	Antimicrobial recommendation when warranted - Use one of the following for 5-7 days for initial therapy (listed in order of preference): 1) Doxycycline 5 mg/kg PO q12h 2) Marbofloxacin 2.75-5.5 mg/kg PO q24h 3) Azithromycin 5-10 mg/kg PO q24h • If mucopurulent discharge recurs after treatment, use the previously effective antimicrobial again for 7-10 days	• Reexamine the patient in 7-10 days or sooner if signs worsen • If signs are improving with antimicrobial therapy, continue antimicrobial until 7 days past resolution of nasal disease or a plateau in response is seen • Ensure patient is current on core vaccinations	• Many cats with chronic upper respiratory tract signs that complete a full work-up are found to have lymphocytic-plasmacytic or mixed inflammation on histology with no identified underlying cause (idiopathic feline rhinosinusitis) • History (vaccine status, exposure to animals, stress) can be particularly helpful in creating the differential list • Cytology of nasal discharge has limited benefit
	Canine Infectious Respiratory Disease Complex (CIRDC) 	• Cytology and C&S of nasal discharge have limited benefit as similar organisms are found in both healthy and diseased dogs	• Coinfection with multiple respiratory pathogens is common. • Viral: canine adenovirus 2, canine distemper virus, canine respiratory coronavirus, canine influenza viruses, canine herpesvirus, canine pneumovirus, canine parainfluenza • Bacterial: *Bordetella bronchiseptica Mycoplasma* spp.	• Inappropriate antimicrobial use for this condition may contribute to antimicrobial resistance	• Viruses cause most cases therefore antimicrobials not needed • Most dogs improve ≤10 days without antimicrobial treatment • Consider antimicrobial therapy if clinical signs persist for >10 days or signs of systemic illness or pneumonia develop • Consider antimicrobial therapy if symptoms and signs include fever, lethargy, or anorexia	Antimicrobial recommendation when warranted - Use one of the following for 7-10 days (listed in order of preference): 1) Doxycycline 5 mg/kg PO q12h 2) Enrofloxacin 5-20 mg/kg PO q24	• Reexamine the patient in 10 days or sooner if signs worsen • Ensure patient is current on core vaccinations	• CIRDC is not associated with chronic upper respiratory disease in dogs • Immunity from vaccines does not prevent colonization and shedding of infectious organisms, although morbidity is decreased in vaccinated dogs
	Pneumonia 	1) Thoracic radiographs 2) CBC 3) Cytologic exam (transtracheal, endotracheal or bronchoalveolar lavage) 4) Aerobic C&S and *Mycoplasma* spp. culture (if diagnostics above support bacterial pneumonia)	• *E. coli*., *Pasteurella* spp., *Bordetella bronchiseptica, Staphylococcus* spp., *Streptococcus zooepidemicus*, *Streptococcus canis, Mycoplasma* spp. • May be polymicrobial	• *Staphylococcus* spp. – Methicillin resistance, MDR • Enterobacterales (*E. coli)* –3rd generation cephalosporin resistance, carbapenem resistance, MDR	• Provide empirical antimicrobial treatment while waiting on C&S results; steroids are not recommended • Bacterial pneumonia frequently treated for 4-6 weeks although evidence to support this duration is lacking • Shorter treatment courses of 10-14 days may be effective	Injectable antimicrobial recommendation - Use one of the following (listed in order of preference) and transition to oral antimicrobials when oral medication is tolerated: 1) Ampicillin sodium 20-40 mg/kg IV q6-8h and enrofloxacin 5-20 mg/kg (5 mg/kg cat) IV q24h 2) Ampicillin sodium 20-40 mg/kg IV q6-8h and doxycycline 5 mg/kg IV q12h 3) Ceftriaxone 15-25 mg/kg IV q12h and azithromycin 5-15 mg/kg PO q24h Oral antimicrobial recommendation - Use one of the following (listed in order of preference): 1) Amoxicillin 11-22 mg/kg PO q8h and enrofloxacin 5-20 mg/kg (5mg/kg cat) PO q24h 2) Amoxicillin 11-22 mg/kg PO q8h and doxycycline 5 mg/kg PO q12h 3) Amoxicillin 11-22 mg/kg PO q8h and azithromycin 5-15 mg/kg (5-10 mg/kg cat) PO q24h	• Reexamine the patient and repeat CBC and thoracic radiographs in 7-14 days or sooner if patient worsens	• Radiographic resolution of pneumonia lags behind clinical cure • Most cases of bacterial pneumonia are secondary to other primary inflammatory causes: viral infection, aspiration of oral/esophageal/gastric contents, aspiration due to pharyngeal or laryngeal functional abnormalities, anesthesia, foreign bodies • Not all cases of aspiration pneumonia require treatment with antimicrobials because disease may be chemical pneumonitis
Oral Cavity	**Dental prophylaxis** 	1) Oral exam 2) Presurgical lab work (CBC/chemistry) 3) Dental radiographs	• Oral flora including both aerobic and anaerobic bacteria • Subgingival and supragingival bacterial populations may be different	• Inappropriate antimicrobial use for this condition may contribute to antimicrobial resistance	• Antimicrobials rarely needed • Consider antimicrobial prophylaxis for patients with heart conditions (and pacemakers) predisposing them to infective endocarditis	Antimicrobial recommendation when warranted - Use one of the following (listed in order of preference): 1) Ampicillin 20-40 mg/kg IV 30-60 min prior to procedure and then every 90 min during procedure 2) Clindamycin (dog) 11-22 mg/kg dog (cat - 10-15 mg/kg) IV single dose 1h prior to procedure 3) Cefazolin 20-22 mg/kg IV single dose 30-60 min prior to procedure	• Annual oral exam important to allow for early treatment of identified pathology	
	Dental extractions 	1) Oral exam 2) Presurgical lab work (CBC/chemistry) 3) Dental radiographs	• Various aerobes and anaerobes	• Inappropriate antimicrobial use for this condition may contribute to antimicrobial resistance	• Dental extraction usually definitive therapy • Antimicrobials rarely needed and should <u>never</u> be used as a sole therapy for oral infections • Consider antimicrobial therapy: Severe soft tissue or bony involvement is present, for patients with heart conditions (and pacemakers) predisposing them to infective endocarditis or other conditions that predispose them to systemic infection (endocrinopathy)	Antimicrobial recommendation (in conjunction with extraction) when warranted - Use one of the following (listed in order of preference): 1) Ampicillin 20-40 mg/kg IV 30-60 min prior to procedure and then every 90 min during procedure 2) Clindamycin (dog) 11-22 mg/kg dog (cat - 10-15 mg/kg) IV single dose 1h prior to procedure 3) Cefazolin 20-22 mg/kg IV single dose 30-60 min prior to procedure Continue with oral antimicrobials if indicated: • Soft tissue: 5-7 days • Bone: 28 days	• Annual oral exam important to allow for early treatment of identified pathology	
	Dental abscess 	1) Oral exam 2) Presurgical lab work (CBC/chemistry) 3) Dental radiographs	• Anaerobes frequently the sole pathogen or a co-pathogen • Polymicrobial infection common	• Consider antimicrobial resistance for patients with a history of recent or recurrent antimicrobial use	• Drainage of abscess and removal of inciting cause (typically tooth) should be performed in all cases and is usually the definitive therapy • Antibiotics not needed if infection is mild without cellulitis, osteomyelitis, or signs of systemic infection • Antimicrobials should <u>never</u> be used as a sole therapy for dental abscesses	Antimicrobial recommendation (in conjunction with removing inciting cause) when warranted - Use one of the following (listed in order of preference): 1) Clindamycin 11-22mg/kg PO q 12h (not effective for Gram-negative organisms) 2) Amoxicillin-clavulanic acid 12.5-20 mg/kg PO q 12h Continue with oral antimicrobials if indicated: • Soft tissue: 5-7 days • Bone: 28 days	• Reexamine the patient in 7-14 days • Annual oral exam important to allow for early treatment of identified pathology	
Other	**Pre/post surgical antibiotics for routine procedures**	• Antibiotics not warranted for routine surgical procedures • Antimicrobial use to prevent infection only justified in cases with a high likelihood of bacterial infection • Sterile technique and proper tissue handling should eliminate the need for prophylactic antibiotics in ovariohysterectomies, orchiectomy and most other sterile procedures	Abbreviations: C&S – culture and susceptibility CBC – complete blood count MDR – multidrug resistance PO – by mouth q – every spp. – species	**Important information on how to use this reference:** **This table provides recommendations for common, generally uncomplicated conditions in order to reduce inappropriate antimicrobial use in clinical practice, avoid unnecessary antibiotic-associated adverse events, and decrease or prevent antimicrobial resistance. Recommendations are appropriate for most routine cases, but provider discretion should be used to evaluate each individual patient. If signs of systemic disease such as fever, lethargy, weakness, or anorexia are present, the case requires further workup and recommendations provided here may be inadequate for treatment. Diagnostics and drugs are listed in order of recommended preference for use. If the above antimicrobial recommendations are ineffective or unsuitable for your patient, consult an appropriate specialist, veterinary pharmacologist, or microbiologist for further treatment guidance.**		References available here: https://doh.wa.gov/ReferenceListAntimicrobialUse A printable copy of the poster is available here: https://waddl.vetmed.wsu.edu/antimicrobial-stewardship/ Please provide feedback on this poster by scanning this code:

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