Our understanding of urinary tract infections (UTIs) in veterinary medicine is rapidly changing. There is new recognition that subclinical bacteriuria is common and may not require therapy in certain patient populations. The guidelines on antimicrobial selection and duration of therapy for UTIs have also evolved. These proceedings summarize the latest recommendations.

Subclinical Bacteriuria
In human medicine, asymptomatic bacteriuria is considered a benign condition in otherwise healthy patients.\(^1\) It is common in older patients with an estimated prevalence of 25-50% in geriatric women and up to 15% in men. For most patients, there are no adverse consequences of asymptomatic bacteriuria. Treatment has no documented benefit, even for patients with comorbidities such as diabetes mellitus, spinal cord disease, and conditions requiring indwelling urinary catheters. The few exceptions (where treatment is recommended) are pregnant women, patients undergoing invasive urological procedures, and patients with recent renal transplants.

Dogs
Estimates for the prevalence of subclinical bacteriuria in dogs are as follows:

- Healthy female dogs: 4 – 9%\(^2,3\)
- Healthy male dogs: 0%\(^2\)
- Senior/geriatric dogs: 5%\(^4\)
- Morbidly obese dogs: 25%\(^5\)
- Dogs with endocrinopathies (diabetes mellitus or hyperadrenocorticism): 25 – 40%\(^6,7\)
- Dogs treated with cyclosporine and/or prednisone: 18-30%\(^8,9\)

One prospective study reported the outcome for untreated subclinical bacteriuria in otherwise healthy dogs.\(^3\) This study followed eight female dogs with subclinical bacteriuria for three months. None developed clinical signs, and bacteriuria resolved spontaneously in half.

Cats
Estimates for the prevalence of subclinical bacteriuria in cats are:

- Healthy cats: <1%\(^10\)
- Non-azotemic senior/geriatric cats: 10-13%\(^11\)
  - 82% (9/11) cats with positive cultures were female
- Cats undergoing urine cultures (variety of comorbidities): 6%\(^12\)
  - The group with subclinical bacteriuria was older (mean 13 years) and the majority (65%) had chronic kidney disease.

One prospective study reported the outcome for untreated subclinical bacteriuria in cats.\(^11\) This study found that most of the cats with a positive culture had persistence of bacteriuria at follow up evaluations. Numbers were small, but there was no association between subclinical bacteriuria and survival, and none of the cats with subclinical bacteriuria had renal pathology at necropsy.
Recommendations for subclinical bacteriuria
Unnecessary antibiotic therapy can have adverse effects on:
- Public health (e.g. antimicrobial resistance)
- Patients (e.g. antimicrobial related side effects)
- Clients (e.g. expense)

Therefore, treatment of subclinical bacteriuria is not recommended. The following exceptions are made:
- Infections with *Corynebacterium urealyticum*, the cause of encrusting cystitis.
- Infections with urease-producing bacteria such as *Staphylococcus*, *Proteus*, and *Pseudomonas*, which are associated with risk for struvite stone formation.
- Patients where dysuria is difficult to appreciate, such as those with neurologic deficits that affect voiding behavior.
- Patients at high risk for ascending or systemic infection; while this population is difficult to define, it could include patients with severe immunocompromised (e.g. severe neutropenia) or anatomical abnormalities (e.g. hydroureter).

Clinical Urinary Tract Infections, i.e. Bacterial Cystitis

Duration
Historically, recommendations were to treat uncomplicated UTIs (e.g. first episode in an otherwise healthy animal) with antimicrobials for 7-14 days. However, justification for this duration was lacking, and the treatment regimen in human patients is only 3 days. Two recent prospective studies in dogs demonstrated no difference in cure rates between groups treated with antimicrobials for 3 days compared with 10-14 days. While there were limitations to these studies, this has shifted the veterinary recommendations to 3-5 days for bacterial cystitis. Recommendations for deep infections are longer: 10-14 days for pyelonephritis and 4-6 weeks for prostatitis.

Empiric therapy
All cases should have a urine culture and sensitivity performed, but empiric therapy may be given while results are pending.

**Bacterial cystitis:**
- Amoxicillin
- Clavamox (may not provide significant benefit for UTIs over amoxicillin)
- Trimethoprim-sulfonamide

**Pyelonephritis or prostatitis:**
- Enrofloxacin, marbofloxacin, orbifloxacin, or pradofloxacin
- Trimethoprim-sulfonamide (BUT risk of adverse effects with long term therapy)

**Drugs to avoid**
- Doxycycline: Laboratories often report susceptibility based on serum minimum inhibitory concentration (MIC) breakpoints, but the urine MIC breakpoint is much lower. One study found that 100% of *E. Coli* UTIs in dogs and cats were resistant to doxycycline when the urine MIC breakpoint was used.
- Ciprofloxacin: The oral bioavailability of ciprofloxacin in dogs is highly variable and often poor.
References