

Bacterial urinary tract infections and subclinical bacteriuria in cats and dogs

Priv.-Doz. Dr. Roswitha Dorsch, Medizinische Kleintierklinik
Clinic of Small Animal Medicine
Centre for Clinical Veterinary Medicine, Faculty of Veterinary Medicine, LMU Munich

Coinvestigators

Prof. Johannes Hirschberger
Dr. Georg Wolf

Clinic of Small Animal Medicine, LMU Munich
Institute of Infectious Diseases and Zoonoses at the
Department of Veterinary Sciences

Summary

Bacterial urinary tract infections are one of the most important reasons for the use of antimicrobial drugs in veterinary medicine and contribute to the development of antimicrobial resistance. Overprescription of antimicrobials in cats and dogs with lower urinary tract signs is common, and particularly critically important antimicrobials such as third generation cephalosporins and fluoroquinolones are overused. Knowledge regarding the prevalence of bacterial isolates and their susceptibilities is required for situations when empirical use is indicated. So far, longitudinal studies comparing resistance rates of a longer periods of time have not been performed. Surveillance is important to recognize trends in resistance development and for appropriate intervention. Neoplasia is a common comorbidity in dogs and cats with positive urine cultures. However, it is not known if chemotherapy increases the risk for urinary tract infections or subclinical bacteriuria.

Research Objectives

The aims of one project were to identify bacterial prevalence in feline urine samples and their antimicrobial resistance over a prolonged time period, to investigate associations with clinical signs (urinary tract infections versus subclinical bacteriuria) and comorbidities. The prevalence of feline uropathogens was investigated over a period of 15 years (2000-2014). Overall, these retrospective analyses included 499 positive urine cultures from 430 cats. The prevalence of uropathogens and their susceptibilities over time were investigated. Furthermore, clinical signs and comorbidities were analysed. Another research objective was to investigate the prevalence of urinary tract infections and subclinical bacteriuria in immunosuppressed animals (dogs receiving chemotherapy). This prospective study included 46 dogs with non-urogenital cancer treated with chemotherapy.

Future study aims are to explore alternative treatments apart from antimicrobial therapy for recurrent urinary tract infections.

Key Findings

About 50% of cats present with clinical signs of urinary tract infection, while 40% of cats have subclinical bacteriuria. In almost 80% of cats with positive urine cultures a predisposing systemic or local comorbidity could be identified. Cats with systemic comorbidities were more likely to have subclinical bacteriuria.

Amoxicillin clavulanic acid and trimethoprim-sulfamethoxazole were the antimicrobial agents with the highest antimicrobial impact factor in this population of cats. Applying the formula to select rational antimicrobial therapy, bacterial isolates were most likely to be susceptible to nitrofurantoin, amoxicillin clavulanic acid, and gentamicin over a period of 15 years with only minor changes in the antimicrobial impact factors over time. Still, between 10% and 25% of *E. coli* isolates from feline urine were resistant to amoxicillin clavulanic acid, third generation

cephalosporins, trimethoprim-sulfamethoxazole, fluoroquinolones, and 5% to 10% were multiresistant isolates.

The findings highlight, that empirical treatment of urine culture-positive cats should be avoided whenever possible. Whether subclinical bacteriuria requires treatment in individual cases, needs to be explored.

In dogs treated with chemotherapy for non-urogenital cancer, the prevalence of positive urine cultures was not significantly higher during chemotherapy (13.0%) than before chemotherapy (10.9%). Therefore, chemotherapy seems not to be a major predisposing factor for the development of positive culture and continuous monitoring of culture-negative dogs appears not to be necessary. Most episodes in culture-positive dogs were classified as subclinical bacteriuria requiring no antibiotic treatment, but few complicated infections were also seen highlighting the need for thorough patient evaluation.

Selected Publications

1. Harrer J, Dorsch R. Bakterielle Harnwegsinfektion und subklinische Bakteriurie des Hundes: eine aktuelle Übersicht. *Tierarztl Prax (K)* 2021; 49(01): 74; doi: 10.1055/s-0040-1722411
2. Dorsch R, Teichmann-Knorrn S, Lund HS. Urinary tract infection and subclinical bacteriuria – A clinical update. *J Feline Med Surg* 2019; 21(11): 1023-1038.
3. Teichmann-Knorrn S, Dorsch R. Significant bacteriuria in cats: urinary tract infection and subclinical bacteriuria – A current review. *Tierarztl Prax (K)* 2018; 46(4): 247-259.
4. Teichmann-Knorrn S, Reese S, Wolf G, Hartmann K, Dorsch R. Prevalence of feline urinary tract pathogens and antimicrobial resistance over five years. *Vet Rec* 2018; 183(1): 21.
5. Marques C, Gama LT, Belas A, Bergström K, Beurlet S, Briend-Marchal A, Broens EM, Costa M, Criel D, Damborg P, van Dijk MA, van Dongen AM, Dorsch R, Espada CM, Gerber B, Kritsepi-Konstantinou M, Loncaric I, Mion D, Mistic D, Movilla R, Overesch G, Perreten V, Roura X, Steenbergen J, Timofte D, Wolf G, Zanoni RG, Schmitt S, Guardabassi L, Pomba C. European multicenter study on antimicrobial resistance in bacteria isolated from companion animal urinary tract infections. *BMC Vet Res* 2016; 12(1): 213.
6. Dorsch R, von Vopelius-Feldt C, Wolf G, Mueller RS, Straubinger RK, Hartmann K. Urinary tract infections in cats: prevalence of comorbidities and bacterial species, and determination of antimicrobial susceptibility to commonly used antimicrobial agents. *Tierarztl Prax (K)* 2016; 44(4): 227-236. doi: 10.15654/TPK-150604.
7. Dorsch R, von Vopelius-Feldt C, Wolf G, Straubinger RK, Hartmann K. Feline urinary tract pathogens: prevalence of bacterial species and antimicrobial resistance over a 10-year period. *Vet Rec* 2015; 176(8): 201.