

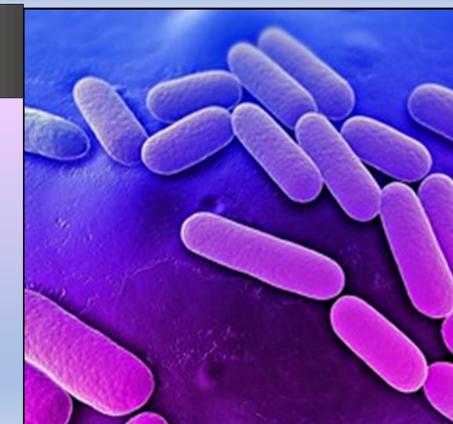
# Epidemiological study and antimicrobial sensitivity in urinary infections (UTI) of companion animals

## INTRODUCTION

- Antimicrobial resistance (AMR) is currently one of the greatest threats to global health. The increasing emergence of multidrug-resistance (MDR) bacteria causing urinary tract infections (UTI) in dogs and cats is of great veterinary public health concern.
- Updated data on the UTI aetiology and its regional susceptibility patterns is of crucial importance for the rational selection and implementation of antimicrobials by the clinicians in a particular region.

## OBJECTIVES

- Describe the prevalence of the most frequently diagnosed bacteria in urine samples from dogs and cats with UTI problems in Spain.
- Determine the prevalence and profiles of antimicrobial sensitivity of the most commonly isolated bacteria.
- Compare the percentages of antimicrobial sensitivity of the bacterial species between dogs and cats.

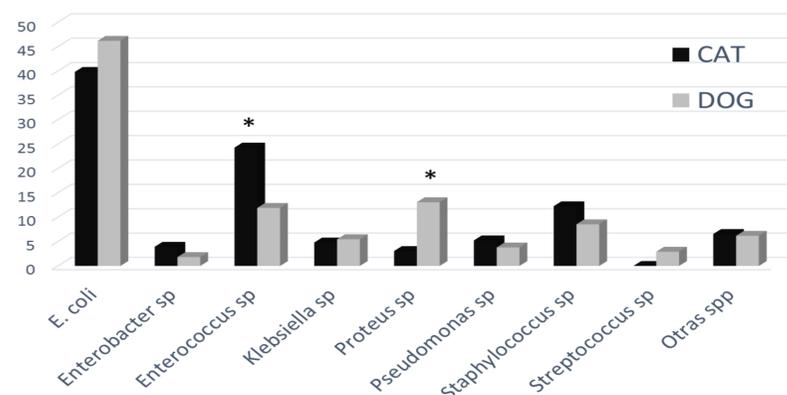


## MATERIAL AND METHODS

- Retrospective data of microbiological results (N=4943) obtained between January 2016 and January 2018 from a large private Laboratory of Diagnosis was used for this study. The analysed data comprised all the microbiological results of urine specimens of dogs (n=3270) and cats (n=1673) with suspected UTI from different provinces of Spain.
- Descriptive and statistical analysis was performed using the SPSS Advanced Models TM. The Chi-square or Fishers Exact tests were used to compare pathogen and AMR frequencies by animal groups. Statistically significant results were considered when P < 0.05.

## RESULTS

Prevalence of bacterial agents in ITU



### Staphylococcus spp.

ATB	DOGS (%)	CATS (%)	Chi <sup>2</sup> value	p-value
AMC	92.3	75.0	9.8	0.03
CEFA	92.3	71.4	13.3	0.001
CFZ	94.8	81.8	7.4	0.01
CTX	90.5	72.7	9.1	0.005
CVN	86.3	64.3	11.2	0.001
CXM	93.1	76.4	9.7	0.005
FOF	90.6	71.4	10.6	0.003
IMP	99.1	87.5	11.6	0.002
MER	94.0	78.6	9.2	0.004

### Enterococcus spp.

ATB	DOGS (%)	CATS (%)	Chi <sup>2</sup> value	p-value
AMK	28.2	14.4	7.2	0.008
CEFA	28.8	8.1	13.6	<0.001
CVN	24.5	11.7	7.0	0.008
DOX	45.4	27.9	8.5	0.004
FOF	55.9	37.8	8.6	0.004
IMP	91.3	82.9	4.4	0.04
TMS	64.0	48.2	6.7	0.012

### Klebsiella spp.

ATB	DOGS (%)	CATS (%)	Chi <sup>2</sup> value	p-value
CEF	61.5	31.6	5.3	0.035
CIP	61.3	31.8	6.0	0.027
CVN	61.3	27.3	7.9	0.007
ENR	49.3	13.6	8.9	0.03
MBF	58.7	22.7	8.8	0.04
PRA	49.3	18.2	6.8	0.013

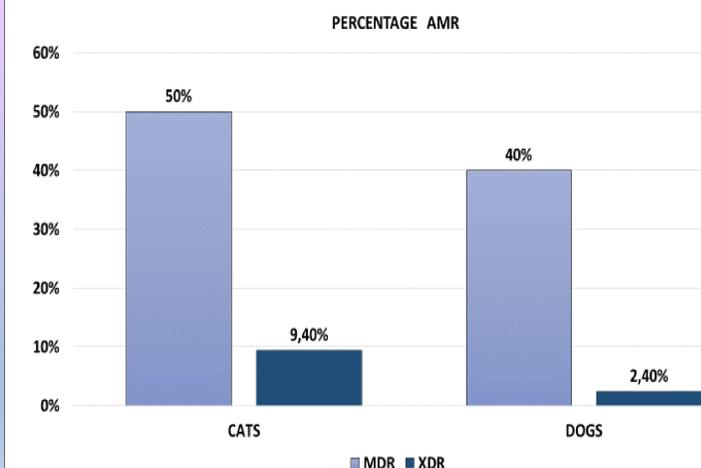
### Proteus spp.

ATB	DOGS (%)	CATS (%)	Chi <sup>2</sup> value	p-value
CVN	83.7	57.1	4.23	0.04
ENR	66.3	35.7	4.02	0.03

**ANTIBIOTIC (ATB):** AMC (amoxicillin + clavulanic), AMK (amikacin), CEF (cephalothin), CEFA (cephalexin), CFZ (cefazolin), CIP (ciprofloxacin), CTX (cefotaxime), CVN (cefovecin), CXM (cefuroxime), DOX (doxycycline), ENR (enrofloxacin), FOF (fosfomicin), IMP (imipenem), MBF (marbofloxacin), MER (meropenem), PRA (pradofloxacin), TMS (trimethoprim + sulfamethoxazole).

- The prevalence of UTI confirmed diagnosis was higher in dogs (42%) than in cats (27%) but the proportion of AMR levels was higher in isolates from cats.
- Although *E. coli* was the most frequently isolated UTI pathogen, the percentage of MDR was lower than other bacteria (*K.pneumoniae*, *P.aeruginosa*, *P. mirabilis*)
- Staphylococcus spp.*, *Enterococcus spp.* and *klebsiella spp.* showed significant differences in antibioticsensitivity levels between dogs and cats, being less sensitive isolates from cats.
- Strains of *Pseudomonas spp.* showed very high levels of resistance in both species, especially to beta-lactams, 3rd generation cephalosporins, and fluoroquinolones.
- Staphylococcus*, and *Enterococcus spp* presented high levels of AMR to cephalosporines, fluoroquinolones, aminoglycosides and carbapenems.

- 42% of the total strains showed MDR profile (4.2% XDR, 0.4% PDR). In Dogs: *Enterococcus spp* (n=3), *K. pneumoniae* (n=1) and *P. mirabilis* (n=1) were PDR. In cats: *P. aeruginosa* (n=1), *K. pneumoniae* (n=1) and *Enterobacter* (n=1) were PDR.
- In general, isolates from cat specimens were more MDR than those from dogs.



MDR: multidrug resistance (resistance to at least one agent in ≥3 ATB categories); XDR: extensive drug resistance (resistance to all but two of the tested ATB categories); PDR: pan-drug (resistance to all the categories tested).

## CONCLUSIONS

- A high prevalence of AMR bacteria is found in urine samples of dogs and cats with clinical suspicion of UTI in Spain. The high levels of MDR found in cat's isolates can be explained by the nature of UTI in cats, which are more complicated and usually highly treated than the ones diagnosed in dogs.
- Most of the AMR were found to antibiotics commonly used in the veterinary praxis. It is extremely important to carry out a good awareness campaign for the doctors to make a rational use of antimicrobials and follow good hygiene guidelines. It would also be advisable to educate the owners of these animals to minimize the risk of contagion of these zoonotic MDR strains.