

Factors associated with the usage of antimicrobials in dogs and cats in first opinion veterinary practices

Background

- Excessive and misuse of antimicrobial drugs are associated with the resurgence of antimicrobial resistance (AMR). Loss of efficacy of antimicrobials and occurrence of infections involving resistant pathogens are major public health concerns^{1,2}
- There is scarce data on the extent and patterns of antimicrobial usage in dogs and cats^{3,4}
- Degree of usage in dogs and cats of antimicrobials deemed as critically important in human medicine for the treatment of severe, life-threatening conditions is unknown

Aims & Objectives

Aim

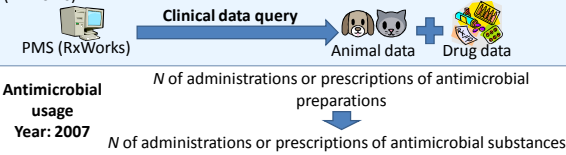
To investigate factors influencing antimicrobial usage in dogs and cats

Objectives

- To quantify and characterise patterns of antimicrobial usage in a convenience sample of first opinion veterinary practices in the UK by analysing clinical data from electronic patient management systems (PMS)
- To identify factors influencing selection of any antimicrobial drugs and of antimicrobials deemed as critically important in human medicine for treatment of dogs and cats

Materials & Methods

A convenience sample of 11 first opinion veterinary practices in the UK were selected from the Royal College of Veterinary Surgeons Directorate. Selection was based on use of electronic practice management system (PMS) (RxWorks)



Antimicrobial substances were grouped according to the Anatomical Therapeutic Classification system (ATCvet) (WHO Collaborating Centre for Drug Statistics Methodology, 2008)

Descriptive analysis and multilevel modelling were conducted through SPSS

17.0 (SPSS Inc) and STATA 9.2 (Stata Corp LP), respectively

- Multilevel logistic regression models assessed the usage of any antimicrobial and usage of critically important antimicrobials in human medicine per animal species at practice level (cut-off value $P < 0.05$)

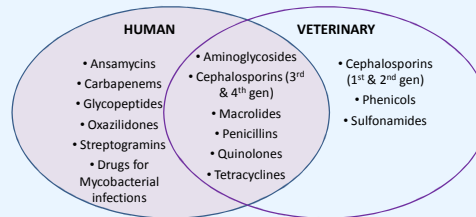
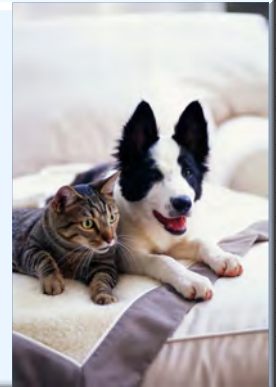


Figure 1- Critically important antimicrobials in human and veterinary medicine (adapted from WHO, OIE 2007)



Results- Descriptive data

- Clinical data from 34,928 dogs and 27,000 cats were collected at the participating veterinary practices. From those, 45.1% and 33.2% of dogs and cats respectively, received at least 1 antimicrobial treatment during the study period
- Overall, 63,422 administrations or prescriptions of antimicrobial preparations which corresponded to 68,997 administrations or prescriptions of antimicrobial substances were considered for this study

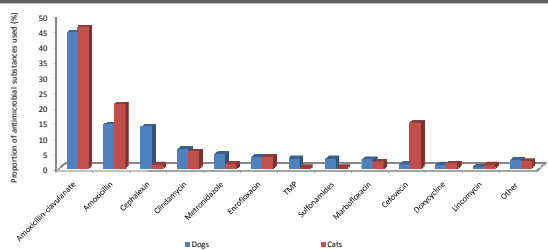


Figure 2- Proportion of prescriptions or administrations of systemic antimicrobial substances ($n=52,987$) in dogs and cats during 2007 at the participating veterinary practices

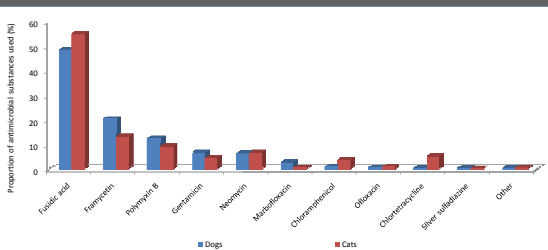


Figure 3- Proportion of prescriptions or administrations of topical antimicrobial substances ($n=16,010$) used in dogs and cats during 2007 at the participating veterinary practices

Discussion

- Potentiated amoxicillin and amoxicillin were the most common systemic antimicrobials used in both species. Similar findings have been reported in Finland^{3,4}
- Cefovecin was the 3rd most common systemic antimicrobial used in cats. This was a novel finding not described previously
- Antimicrobials deemed as critically important were less likely to be used if topical preparations were selected for animal therapy

- Neutered animals were less likely to be treated with antimicrobials. This may be due to behavioural differences that could make entire animals more prone to trauma or infectious diseases that would require antimicrobial therapy
- Protocols for antimicrobial usage in practice was associated with usage of critically important antimicrobials in cats. This result should be interpreted carefully, as it was observed that at least in one of the veterinary practices in this study had written protocols which were not followed by veterinary surgeons

Conclusions

- Widespread usage of broad spectrum antimicrobials was observed in both dogs and cats
- High usage of antimicrobials deemed as critically important in humans was also detected in both species; however, it was not possible to ascertain the potential implications for public health
- Selection of topical antimicrobials in the participating veterinary practices was found to be a protective factor for the use of any antimicrobials and may indirectly reduce selective pressure for antimicrobial resistance. However, further research would be necessary to confirm this association

Results- Multilevel analysis

Table 1- Factors associated with the usage of any antimicrobial drug for the treatment of dogs and cats in the participating veterinary practices (*number of observations*= 197,169 (dogs) and 99,422 (cats)) identified by multilevel logistic regression analysis

	Variables	OR	S.E.	P value	95% CI
Random effect	Veterinary practice				
Dogs	Neutered vs Entire animals	0.859	0.023	<0.001	0.815-0.904
Cats	Female vs Male animals	0.859	0.025	<0.001	0.812-0.909
	Neutered vs Entire animals	0.841	0.032	<0.001	0.780-0.907

Table 2- Factors associated with the usage of antimicrobials deemed as critically important in human medicine for treatment of dogs and cats in the participating veterinary practices (*number of observations*= 35,738 (dogs) and 14,572 (cats)) identified by multilevel logistic regression analysis

	Variables	OR	S.E.	P value	95% CI
Random effect	Veterinary practice				
Dogs	Female vs Male animals	1.188	0.042	<0.001	1.108-1.237
	Topical vs Systemic preparations	0.457	0.067	<0.001	0.343-0.609
Cats	Protocols for antimicrobial usage	2.205	0.345	0.018	1.143-4.255
	Topical vs Systemic preparations	0.065	0.345	<0.001	0.031-0.138

1. WHO (2007) Critically important antimicrobials for human medicine: categorization for the development of risk management strategies to contain antimicrobial resistance due to non-human antimicrobial usage (Ed. Consultations and Workshops- Report of the 2nd WHO expert meeting, Geneva, World Health Organization)

2. OIE (2007) OIE List of antimicrobials of veterinary importance, Paris

3. RANTALA, M., HOLSO, K., LILLAS, A., HUOVINEN, P. & KAARTINEN, L. (2004) Survey of condition-based prescribing of antimicrobial drugs for dogs at a veterinary teaching hospital. *Vet Rec.* 155, 259-262.

4. THOMSON, K.M., Rantala, M.H.J., VIITA-AHO, T.K., VAINO, O.M. & KAARTINEN, L.A. (2009). Condition-based use of antimicrobials in cats in Finland: results of 2 surveys. *JFMS*, 11, 462-466.

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