Small animal *Review*

Summary: Antimicrobial use is influenced by vaccination status, neutering and membership of the Royal College of Veterinary Surgeons practice standards scheme. Responsible antimicrobial use is promoted through use of preventative medicine and client engagement. https://doi.org/10.12968/coan.2020.0077

Bryn Tennant, BVSc, PhD, MRCVS Capital Diagnostics, SRUC Veterinary Services.
bryn.tennant@sac.co.uk

Factors that influence antimicrobial use

Antimicrobial stewardship promotes appropriate use of antimicrobials via interventions that assess and improve their use through appropriate selection. The aim is to optimise clinical outcomes, minimise adverse effects and limit the development of antimicrobial resistance.

In veterinary medicine there is concern over increased rates of meticillin-resistant *Staphylococcus pseudintermedius* (MRSP) and *Escherichia coli* producing extended-spectrum β-lactamase (ESBL). Other multidrug resistant bacterial pathogens of concern include *Pseudomonas aeruginosa*, *Proteus* spp., *Enterococcus* spp., meticillin-resistant *S. aureus* (MRSA), carbapenemase-producing *E. coli* and *Klebsiella pneumoniae*, and multidrug resistant *Acinetobacter baumannii*.

Widespread use of the critically important antibiotics (β-lactamase–resistant penicillins, third generation cephalosporins, and fluoroquinolones) increases the likelihood of bacteria developing resistance to them, including MRSA, MRSP and ESBL-producing *E. coli*. However, these antibacterials are important for the management of serious bacterial infections in animals, including complicated skin and urinary tract infections and life-threatening infections. Thus, these highly important antimicrobials have been the most used but the least preserved antibiotics.

To reduce the risk of antimicrobial resistance developing it is necessary to optimise antimicrobial use, which requires an understanding of prescription practice. Singleton and others (2020) assessed the value of electronic health records in understanding what might influence the prescribing of antimicrobial drugs. Using data in practice management systems at 386 sites, they explored associations between antimicrobial prescribing and veterinary practice, practitioner, client, and animal-related factors.

For dogs they identified that systemic antimicrobial drugs were prescribed during 25.7% of consultations, topical antimicrobials during 14.2% and systemic highest priority critically important antimicrobials (HPCIAs) during 1.4%. Fluoroquinolones were the most commonly prescribed HPCIA, followed by third-generation cephalosporins and macrolides. Systemic antimicrobials were less likely to be prescribed for vaccinated, neutered or insured dogs up to 12 years of age and by RCVS-accredited practices, and more likely to be prescribed for a respiratory tract rather than a gastroenteric presentation. Topical antimicrobial drugs were less likely to be prescribed for insured dogs, although increased use was reported for males, microchipped, or vaccinated dogs, while antimicrobial use increased with a history of pruritus.

For cats, systemic antimicrobial drugs were prescribed during 32.9% of consultations, topical antimicrobials during 6.1% and systemic HPCIAs during 17.3%. Third-generation cephalosporins were the most commonly prescribed HPCIA, followed by fluoroquinolones and macrolides (0.03%). Vaccinated and insured cats were less likely to receive an antimicrobial, while the highest use was seen in those presenting with respiratory or trauma signs, and in males. Insured cats were less likely to be prescribed topical antimicrobials.

The authors showed that, in the veterinary setting, pooling data from electronic health records is a valuable tool in assessing the influence that practice, animal and client factors may have on the prescribing of antimicrobials. They documented the frequency of antimicrobial drug use and identified factors that may drive prescribing behaviours, information that is useful in setting antimicrobial stewardship targets.

By extension, such records should be of value across a wide range of clinical situations. The main qualification is that this only provides a quantitative assessment of what might influence a clinician's decision, it cannot assess why the decision was reached. For example, the authors discuss why vaccinated dogs and cats received fewer antimicrobial drugs. They suggest there may be a perceived or actual reduced risk of an antimicrobial drug-responsive disease in these patients and speculate 'that previous engagement with preventive healthcare services might select for clients more likely to seek veterinary attention earlier or to pursue diagnostic options rather than empirical prescription'. The authors suggest that recommendations in the O'Neill report should be considered for companion animals. Such a recommendation based on speculation only is difficult to follow through on and emphasises the importance of qualitative information in driving policy.

The authors discuss in detail the factors that were associated with antimicrobial prescribing, e.g. insurance coverage and animal-specific features, and the reader is directed to the paper for these discussions. Of interest is a section in their discussion that comments on the importance of practice accreditation through the RVSC practice standards scheme. Many of the identified elements that impact on antimicrobial use relate to the individual animal. However, it is more likely that the veterinary practice's attitude and policies will have a greater impact on the development of stewardship, and involvement with the practice standards scheme appears to be a major influencing factor. The authors comment that it is unclear why that is so, but it is encouraging to see quantitative evidence that a practice's attitude to improving quality in their practice is linked positively to reducing antimicrobial use.

Reference

Singleton DA, Pinchbeck GL, Radford AD et al. Factors associated with prescription of antimicrobial drugs for dogs and cats, United Kingdom, 2014-2016. Emerg Infect Dis. 2020;26(8):1778–1791. https://doi.org/10.3201/eid2608.191786