



Qualitative study of factors associated with antimicrobial usage in seven small animal veterinary practices in the UK



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ABSTRACT

Responsible use of antimicrobials by veterinarians is essential to contain antimicrobial resistance in pathogens relevant to public health. Inappropriate antimicrobial use has been previously described in practice. However, there is scarce information on factors influencing antimicrobial usage in dogs and cats. We investigated intrinsic and extrinsic factors influencing decision-making of antimicrobial usage in first opinion small animal practices in the UK through the application of qualitative research methods.

Semi-structured interviews were conducted with 21 veterinarians from seven veterinary first opinion practices in the UK in 2010. Topics investigated included: a) criteria used for selection of antimicrobials, b) influences by colleagues, c) influences by clients, d) pet characteristics, e) sources of knowledge, f) awareness of guidelines and g) protocols implemented in practice that may affect antimicrobial usage by veterinarians. Hypothetical scenarios selected to assess appropriateness of antimicrobial usage were: a) vomiting in a Yorkshire Terrier due to dietary indiscretion, b) deep pyoderma in a Shar-Pei, c) Feline Lower Urinary Tract disease in an 7 year-old male neutered cat and d) neutering of a 6-months dog. Interviews were recorded and transcribed by the interviewer. Thematic analysis was used to analyse content of transcribed interviews. Data management and analysis was conducted with qualitative analysis software NVivo8 (QSR International Pty Ltd).

Antimicrobial usage by participants was influenced by factors other than clinical evidence and scientific knowledge. Intrinsic factors included veterinarian's preference of substances and previous experience. Extrinsic factors influencing antimicrobial selection were; perceived efficacy, ease of administration of formulations, perceived compliance, willingness and ability to treat by pet owners, and animal characteristics. Cost of therapy was only perceived as an influential factor in low, mixed socioeconomic areas. Veterinarians had limited awareness of current recommendations for responsible use in small animal practice. Social norms, particularly verbally agreed protocols influenced veterinarians. Inappropriate antimicrobial usage was identified in the therapy of non-infectious diseases and prophylaxis of routine clean surgical procedures.

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Discussion of clinical cases with peers and effectiveness meetings in the workplace were useful to veterinarians to share scientific knowledge. Effectiveness meetings can be a common ground for veterinarians to discuss and agree protocols for clinical conditions and surgical procedures. Protocols should be evidence-based, follow current recommendations and take into account the resources available in the workplace. Targeted training of veterinarians in the workplace with peer support should be used to promote responsible antimicrobial usage.

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1. Introduction

Inappropriate and excessive antimicrobial use (AMU) has been reported in small animal practice (Watson and Maddison, 2001; Hill et al., 2006; German et al., 2010). It can cause antimicrobial resistance (AMR) in bacterial populations with serious implications for both animal and public health (Guardabassi et al., 2004; Rantala et al., 2004; Morley et al., 2005). Recent qualitative research studies show that factors other than scientific knowledge and recommended guidelines influence practitioners resulting in inappropriate AMU in humans (Paredes et al., 1996; Carthy et al., 2000; Coenen et al., 2000; Cantrell et al., 2002; Trémolières, 2003; de Souza et al., 2006; Barlow et al., 2008; Cortoos et al., 2008; Altiner et al., 2010; Charani et al., 2011).

Investigation of decision-making processes in veterinary settings with qualitative methodologies is not novel. However, research has been focused on the investigation of attitudes and beliefs towards food safety, biosecurity and AMU in food-producing animals (Vaarst et al., 2002; Jansen et al., 2009; Lastein et al., 2009; Ellis-Iversen et al., 2010; Young et al., 2010). There is an extensive body of qualitative research literature in relation to AMU in humans but to our knowledge this is limited in small animals (Sahoo et al., 2010). The majority of the studies currently available use quantitative methods to assess attitudes of small animal veterinarians towards AMU (Knights et al., 2012; Pleydell et al., 2012).

The objective of this study was to identify intrinsic and extrinsic factors that influence the decision-making process involved in the selection of AMs by small animal veterinarians through qualitative methods. Awareness of current guidelines and appropriateness of AMU in veterinary practice was also investigated.

2. Materials and methods

Approval from the Ethics and Welfare Committee of the Royal Veterinary College (RVC) was obtained. A convenience sample of veterinarians was recruited from British practices that had participated in a related RVC project investigating extent and patterns of AMU (Mateus et al., 2011). These practices were selected through the Royal College of Veterinary Surgeons (RCVS) directorate. Criteria for selection were; (a) use of a specific electronic patient management system (i.e. RxWorks Inc, UK) with a built-in query for data extraction and (b) provision of veterinary care to small animals. Veterinarians were recruited

through practice managers and senior partners. One to six veterinarians were recruited per practice depending on staff availability. A semi-structured questionnaire was developed based on the topics described above (see supplementary material). Questions were re-defined throughout the research process. Four hypothetical case scenarios were included to investigate appropriateness of AMU (Table 1). Pilot interviews were conducted in a referral practice (*data not shown*) for validation purposes. Ambiguous and leading questions were modified accordingly based on the feedback provided. One of the scenarios (i.e. cystitis in a cat) was replaced by Feline Lower Urinary Tract Disease (FLUTD) and another one was redefined from 'pyoderma' to 'deep pyoderma' in dogs to exclude superficial pyoderma.

Written consent was obtained from interviewees. Interviews were recorded with a digital device (Olympus DS-2400, UK) and transcribed into Word (Microsoft Office 2007, Microsoft Corporation, USA) by the first author. Veterinarians were identified during analysis as F_n (where n ranged between 1 and 21). Veterinary practices were coded as ' P_n ' (where n ranged between 1 and 7). Transcripts and memos were transferred into NVivo8 (QSR International Pty Ltd., UK) for data management and analysis.

Thematic analysis was used for the purpose of this study, as it allows both inductive and deductive reasoning (Boyatzis, 1998; Braun and Clarke, 2006; Pope and Mays, 2006). A "rich thematic description" and interpretation of the overall data collected to explain the phenomena of interest through analytical narrative was performed by the first author (Braun and Clarke, 2006). Themes (e.g. non-compliance by pet owners, client's expectations for AM prescriptions, peer pressure, cost of therapy) were pre-defined based on current scientific evidence on factors influencing AMU in humans and food-producing animals and, to a lesser extent, on small animal's AMU quantitative studies. This *a priori* knowledge was used to identify common themes and patterns across participants (Table 2).

Table 1

Hypothetical case studies used to assess appropriateness of AMU in small animals by participating veterinarians ($n = 21$).

1. Acute vomiting in a 14 year-old Yorkshire Terrier caused by diet indiscretion (i.e. garbage scavenging)
2. Feline Lower Urinary Tract Disease (FLUTD) in a 7 year-old male, neutered, overweight, indoor cat
3. Deep pyoderma in a male 3 year-old Shar-Pei dog
4. Neutering of a 6 months-old healthy, male dog

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