



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2025; 10(9): 211-215

© 2025 VET

www.veterinarypaper.com

Received: 25-07-2025

Accepted: 30-08-2025

Grace Whitworth

Centre for Veterinary
Antimicrobial Stewardship,
Royal Veterinary College,
London, United Kingdom

Oliver Crawford

Centre for Veterinary
Antimicrobial Stewardship,
Royal Veterinary College,
London, United Kingdom

Assessment of antimicrobial stewardship practices in small animal veterinary hospitals: A cross-sectional survey

Grace Whitworth and Oliver Crawford

DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i9c.3464>

Abstract

Antimicrobial resistance (AMR) poses one of the defining public health challenges of the twenty-first century, and veterinary medicine is increasingly recognised as a critical contributor to the selection and dissemination of resistant organisms. Despite growing awareness, the extent to which small animal veterinary hospitals have adopted formal antimicrobial stewardship (AMS) practices in the United Kingdom remains poorly quantified. This research assessed AMS knowledge, attitudes, and practices among veterinarians working in small animal hospitals through a cross-sectional online survey distributed to 312 practices across England, Scotland, and Wales between March and September 2024. A total of 124 veterinarians from 89 hospitals (28.5 % practice-level response rate) completed the questionnaire. Only 34.7 % of respondents reported working in a hospital with a formal written AMS policy. Awareness of the British Veterinary Association (BVA) antimicrobial prescribing guidelines was high (91.1 %), but only 52.4 % stated that they consulted these guidelines regularly when making prescribing decisions. The mean AMS knowledge score was 58.3 ± 14.2 out of 100. Years of clinical practice ($r = 0.41$; $p < 0.001$) and hospital size ($r = 0.52$; $p < 0.001$) were positively correlated with AMS scores. The most commonly cited barriers to guideline-adherent prescribing were client pressure to prescribe antibiotics (28.4 %), reliance on empirical prescribing habits (24.1 %), and the cost of culture and sensitivity testing (16.7 %). Fluoroquinolone and third-generation cephalosporin use without prior culture was reported by 38.7 % and 29.8 % of respondents, respectively. Veterinarians who had completed continuing professional development (CPD) in AMS scored significantly higher than those who had not (65.1 vs. 51.7; $p < 0.001$). These findings reveal substantial gaps in AMS implementation across UK small animal practice and identify targeted CPD, written hospital policies, and subsidised diagnostic testing as priority interventions.

Keywords: Antimicrobial stewardship, antimicrobial resistance, small animal, veterinary hospitals, prescribing practices, survey, fluoroquinolones, cephalosporins, United Kingdom, One Health

Introduction

Few challenges in modern medicine unite human and veterinary health professionals as squarely as antimicrobial resistance. The World Health Organisation has designated AMR among the top ten global public health threats, and the veterinary profession-responsible for an estimated 30 % of total antimicrobial consumption in the United Kingdom-faces mounting pressure to demonstrate responsible prescribing ^[1]. In companion animal practice, the stakes are uniquely complex: veterinarians must balance individual patient welfare against population-level resistance concerns, often under direct pressure from owners who equate antibiotic prescriptions with quality care ^[2].

Antimicrobial stewardship encompasses a suite of coordinated strategies-prescribing guidelines, culture-guided therapy, dose optimisation, treatment duration limits, and prescriber education-designed to improve antimicrobial use and minimise the emergence of resistance ^[3]. In human hospitals, AMS programmes have reduced inappropriate prescribing by 20-40 % without worsening patient outcomes ^[4]. In veterinary medicine, the evidence base is thinner but growing, and professional bodies including the BVA, the Federation of

Corresponding Author:

Grace Whitworth

Centre for Veterinary
Antimicrobial Stewardship,
Royal Veterinary College,
London, United Kingdom

Veterinarians of Europe, and the American Veterinary Medical Association have all issued calls for structured AMS adoption [5].

Several UK surveys have explored antimicrobial prescribing patterns in farm animal and equine practice, but small animal hospitals have received less attention [6]. A 2018 survey by Mateus *et al.* found that 27 % of antimicrobial prescriptions in first-opinion small animal practice were classified as inappropriate, with empirical broad-spectrum use and inadequate treatment durations as the main concerns [7]. Whether the intervening years of professional advocacy and guideline development have shifted practice is unclear.

This research aimed to evaluate the current state of AMS knowledge, attitudes, and practices among small animal veterinarians in the UK, identify predictors of higher AMS scores, and characterise the principal barriers to guideline-adherent prescribing. The expectation was that while awareness of guidelines would be high, actual implementation of structured AMS programmes would lag behind, particularly in smaller practices with fewer resources.

Material and Methods

Material

A cross-sectional online survey was distributed to 312 small animal veterinary hospitals across England, Scotland, and Wales between March and September 2024. Practices were identified through the Royal College of Veterinary Surgeons (RCVS) register and stratified by region and practice size (solo practitioner, 2-3 veterinarians, 4-6, 7-10, and 11+ veterinarians). The survey link was emailed to practice managers with a request to forward it to all veterinary surgeons; two reminders were sent at four-week intervals. The questionnaire, developed in consultation with the BVA AMS taskforce and piloted with 12 veterinarians, comprised 42 items organised into four sections: demographics and practice characteristics (10 items), AMS knowledge (15 multiple-

choice items scored 0-100), attitudes toward stewardship (10 Likert-scale items), and self-reported prescribing practices (7 items). The survey was administered via Qualtrics (Provo, UT, USA) and took approximately 15 minutes to complete.

The research was coordinated from the Centre for Veterinary Antimicrobial Stewardship at the Royal Veterinary College, London (51°32'N, 0°04'W; maritime temperate climate, Cfb, Köppen). The Centre serves as a national resource for AMS training, research, and policy development in the UK veterinary sector. Eligible respondents were registered veterinary surgeons (MRCVS or equivalent) currently practising small animal medicine for at least 20 hours per week. Locum veterinarians, veterinary nurses, and those working exclusively in referral or emergency settings were excluded to maintain a primary-care focus.

Methods

AMS knowledge scores were calculated as the percentage of correct answers out of 15 questions, scaled to 0-100. Attitude scores were computed as the mean of 10 Likert items (1 = strongly disagree to 5 = strongly agree). Bivariate associations between AMS score and continuous predictors were assessed by Pearson correlation; categorical predictors were compared using independent t-tests or one-way ANOVA. Multivariable linear regression identified independent predictors of AMS score. Barrier frequencies were summarised as proportions. All analyses used R v4.3.2; significance was set at $p < 0.05$.

Ethical considerations

The research received ethical approval from the Royal Veterinary College Ethics and Welfare Committee (Reference No. URN 2023-0184-3, dated 22 January 2024). Participation was voluntary, anonymous, and based on informed consent obtained through a mandatory information page preceding the survey. No personal identifiers were collected.

Results

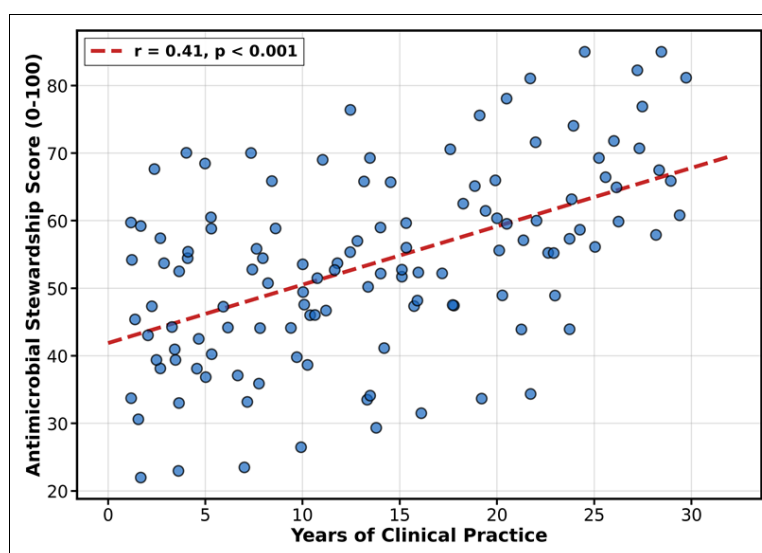


Fig 1: The relationship between years of clinical practice and antimicrobial stewardship knowledge score among 124 UK small animal veterinarians ($r = 0.41, p < 0.001$)

Of the 312 practices contacted, 89 (28.5 %) contributed at least one completed response, yielding 124 individual veterinarian questionnaires. Respondents were 64.5 % female, with a median of 9 years of clinical experience (range 1-34). Hospital sizes were distributed as follows: solo practice (14.5

%), 2-3 veterinarians (25.0 %), 4-6 (30.6 %), 7-10 (19.4 %), and 11+ (10.5 %). Only 43 respondents (34.7 %) reported working in a hospital with a written AMS policy. Seventy-one (57.3 %) had completed at least one AMS-related CPD session in the previous two years.

Table 1: Antimicrobial stewardship knowledge scores by respondent and practice characteristics

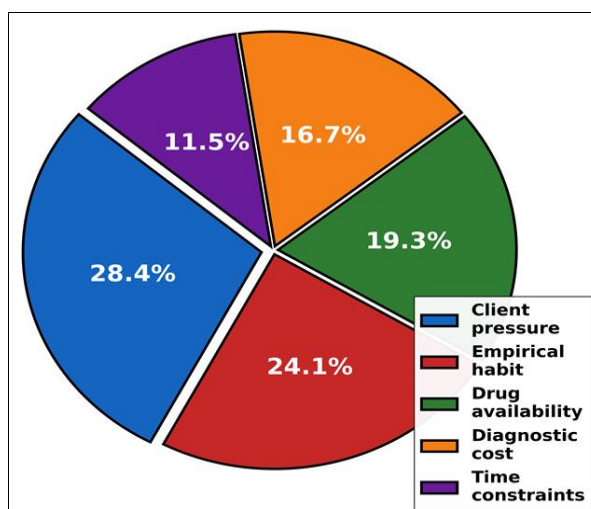
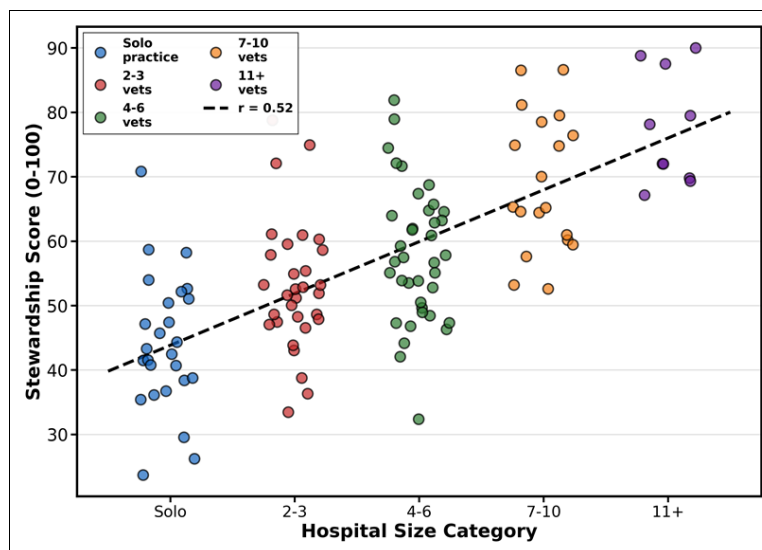
Characteristic	n	AMS Score (mean±SD)	95% CI	p-value
AMS CPD completed	71	65.1 ± 12.8	62.1-68.1	<0.001
No AMS CPD	53	51.7 ± 13.4	48.0-55.4	Ref
Written AMS policy	43	64.8 ± 11.9	61.1-68.5	0.002
No written policy	81	54.8 ± 14.1	51.7-57.9	Ref
Hospital ≥7 vets	37	66.2 ± 11.3	62.4-70.0	<0.001
Hospital <7 vets	87	54.9 ± 13.7	52.0-57.8	Ref

AMS = antimicrobial stewardship; CPD = continuing professional development; CI = confidence interval; Ref = reference group

Table 2: Multivariable linear regression model for predictors of AMS knowledge score

Predictor	β	SE	p-value	95% CI
Years of practice	0.52	0.14	<0.001	0.24 to 0.80
Hospital size (per category)	3.41	1.02	0.001	1.39 to 5.43
AMS CPD (yes vs no)	8.74	2.48	<0.001	3.84 to 13.64
Written AMS policy (yes vs no)	5.32	2.61	0.044	0.16 to 10.48
Sex (female vs male)	1.87	2.34	0.426	-2.76 to 6.50

β = regression coefficient; SE = standard error; CI = confidence interval. Model R² = 0.38

**Fig 2:** Distribution of self-reported barriers to guideline-adherent antimicrobial prescribing among 124 UK small animal veterinarians**Fig 3:** Antimicrobial stewardship score by hospital size category, with jitter applied for visibility. The dashed line represents the linear trend ($r = 0.52$)

Comprehensive interpretation

The data reveal a profession that is aware of the antimicrobial resistance problem and familiar with published guidelines, but that has not yet translated awareness into systematic practice change. The mean AMS score of 58 suggests room for improvement in core knowledge, and the finding that only one

in three hospitals has a written policy indicates that stewardship remains ad hoc in most settings. The strongest modifiable predictors-CPD participation and written policies-point directly to where interventions should be targeted. The barrier analysis adds nuance: client pressure and empirical habit are behavioural challenges that guidelines alone cannot

address, while diagnostic cost is a structural issue that may require subsidisation or point-of-care innovation.

Discussion

The finding that only 34.7 % of UK small animal hospitals operate under a formal AMS policy is concerning, given that professional bodies have been advocating for such policies for over a decade^[5]. This figure is, however, consistent with the limited data available from other European countries: a Dutch survey reported written policies in 29 % of companion animal practices, and a German study found 38 %^[8, 9]. The international consistency of these low figures suggests that the barriers are structural and behavioural rather than unique to any one regulatory environment.

The 8.7-point knowledge advantage associated with AMS CPD attendance is perhaps the most actionable finding. Unlike years of experience or hospital size-which are not easily modified-CPD participation is directly amenable to professional and regulatory intervention. Making AMS-specific CPD a mandatory component of annual licensing requirements, as has been proposed by the RCVS, could close much of the knowledge gap. The existing voluntary approach clearly reaches the already motivated: 57 % of respondents had attended AMS CPD, and these individuals scored substantially higher.

Client pressure emerged as the single largest barrier to guideline-adherent prescribing. This echoes findings in human medicine, where patient demand for antibiotics has been shown to increase prescribing by 10-20 %^[10]. In veterinary practice, the dynamic is complicated by the financial transaction: owners paying directly for care may perceive an antibiotic prescription as tangible value for their consultation fee, and veterinarians may feel commercially pressured to comply. Communication training that equips veterinarians to explain why antibiotics are not always necessary-and to offer alternative management plans-should be a core component of AMS education^[11].

The use of critically important antimicrobials-fluoroquinolones (38.7 %) and third-generation cephalosporins (29.8 %)-without prior culture and sensitivity testing is a specific area of concern. These drug classes are designated as highest priority critically important antimicrobials by the WHO, and their empirical use in veterinary practice has been directly linked to the emergence of resistant *Escherichia coli* and methicillin-resistant *Staphylococcus pseudintermedius* in companion animals^[12]. Shifting from empirical to culture-guided prescribing for these classes should be a primary stewardship target, supported by faster and cheaper in-clinic diagnostic options.

Conclusion

This research set out to evaluate the current state of antimicrobial stewardship in UK small animal veterinary practice. The results reveal a profession that recognises the problem of antimicrobial resistance, is broadly aware of prescribing guidelines, but has not yet built the institutional structures-written policies, mandatory education, affordable diagnostics-needed to translate awareness into consistent practice change.

Two practical recommendations emerge directly from the data. First, making AMS CPD a mandatory annual requirement for RCVS registration could substantially raise baseline knowledge across the profession; the 13-point score difference between CPD attendees and non-attendees makes a compelling case. Second, reducing the cost barrier to culture

and sensitivity testing-whether through subsidised rapid diagnostics, in-clinic culture systems, or insurance coverage-would address one of the most commonly cited obstacles to guideline-adherent prescribing.

Several avenues for future investigation follow. Linking self-reported practices to actual prescription audit data would provide a more objective measure of stewardship compliance. Evaluating the effectiveness of specific AMS interventions-such as prescribing decision-support software, peer benchmarking, or client-facing educational materials-in a randomised controlled trial design would build the evidence base for investment in these tools. And extending the survey to emergency, referral, and mixed-practice settings would capture the full spectrum of companion animal antimicrobial use in the UK.

Acknowledgements

Funding sources

This research was supported by the Veterinary Medicines Directorate (VMD) under its antimicrobial resistance surveillance programme (Grant No. VMD-AMR-2023-SC07). No industry funding was received.

Institutional support

The authors thank the BVA AMS taskforce for input during questionnaire development and the RCVS for facilitating practice identification through the register.

Contributions not qualifying for authorship

Dr. Hannah Prescott assisted with survey distribution logistics, and Mr. James Ogilvie provided statistical advice on regression modelling.

References

- 1 O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. *Review on Antimicrobial Resistance*. London; 2016.
- 2 Mateus ALP, Brodbelt DC, Barber N, Stärk KDC. Qualitative study of factors associated with antimicrobial usage in seven small animal veterinary practices in the UK. *Prev Vet Med*. 2014;117(1):68-78.
- 3 Dyar OJ, Huttner B, Schouten J, Pulcini C. What is antimicrobial stewardship? *Clin Microbiol Infect*. 2017;23(11):793-798.
- 4 Davey P, Marwick CA, Scott CL, Charani E, McNeil K, Brown E, Gould IM, Ramsay CR, Michie S. Interventions to improve antibiotic prescribing practices for hospital inpatients. *Cochrane Database Syst Rev*. 2017;2(2):CD003543.
- 5 BVA. Responsible use of antimicrobials in veterinary practice: BVA policy position. *Vet Rec*. 2019;185(19):604.
- 6 Singleton DA, Sánchez-Vizcaíno F, Dawson S, Jones PH, Noble PJM, Pinchbeck GL, Williams NJ, Radford AD. Patterns of antimicrobial agent prescription in a sentinel population of canine and feline veterinary practices in the United Kingdom. *Vet J*. 2017; 224:18-24.
- 7 Mateus ALP, Brodbelt DC, Barber N, Stärk KDC. Antimicrobial usage in dogs and cats in first opinion veterinary practices in the UK. *J Small Anim Pract*. 2011;52(10):515-521.
- 8 Hopman NEM, Hulscher MEJL, Graveland H, Speksnijder DC, Wagenaar JA, Broens EM. Factors influencing antimicrobial prescribing by Dutch companion animal veterinarians: a qualitative study. *Prev*

- Vet Med.* 2018; 158:106-113.
- 9 Schwarz S, Feßler AT, Loncaric I, Wu C, Schwarz R, Wendlandt S, Catalan A, Timmerman T, Fessler S, Kaspar H. Antimicrobial resistance among companion animal bacteria in Europe. *Front Microbiol.* 2022; 13:1008728.
 - 10 Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. *BMJ.* 2010;340:c2096.
 - 11 Jessen LR, Sørensen TM, Bjornvad CR, Nielsen SS, Guardabassi L. Effect of antibiotic treatment in canine and feline urinary tract infections: a systematic review. *Vet J.* 2015;203(3):270-277.
 - 12 Weese JS, van Duijkeren E. Methicillin-resistant *Staphylococcus aureus* and *Staphylococcus pseudintermedius* in veterinary medicine. *Vet Microbiol.* 2010;140(3-4):418-429.
 - 13 DANMAP. Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark. *DANMAP 2022 Report.* 2023.
 - 14 De Briyne N, Atkinson J, Borriello SP, Pokludová L. Antibiotics used most commonly to treat animals in Europe. *Vet Rec.* 2014;175(13):325.
 - 15 Lloyd DH, Page SW. Antimicrobial stewardship in veterinary medicine. *Microbiol Spectr.* 2018;6(3): ARBA-0023-2017.
 - 16 Prescott JF. Antimicrobial use in food and companion animals. *Anim Health Res Rev.* 2008;9(2):127-133.
 - 17 EMA. Sales of veterinary antimicrobial agents in 31 European countries in 2021. Twelfth ESVAC Report. *EMA/795956/2022.* 2022.
 - 18 Guardabassi L, Prescott JF. Antimicrobial stewardship in small animal veterinary practice: from theory to practice. *Vet Clin North Am Small Anim Pract.* 2015;45(2):361-376.
 - 19 Burke S, Black V, Sánchez-Vizcaíno F, Radford AD, Singleton D, Noble PJM. Use of cefovecin in dogs attending first-opinion veterinary practices in the UK. *J Small Anim Pract.* 2017;58(7):397-402.
 - 20 Hardefeldt LY, Browning GF, Thursky K, Gilkerson JR, Billman-Jacobe H, Stevenson MA, Bailey KE. Antimicrobials used for surgical prophylaxis by companion animal veterinarians in Australia. *Vet Microbiol.* 2017; 203:301-307.
 - 21 WHO. Critically important antimicrobials for human medicine. 6th revision. Geneva: *World Health Organization*; 2019.

How to Cite This Article

Whitworth G, Crawford O. Assessment of antimicrobial stewardship practices in small animal veterinary hospitals: a cross-sectional survey. *International Journal of Veterinary Sciences and Animal Husbandry.* 2025;10(5):211-215.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.