Appendix. Supplementary material

Supplementary material 1. The inclusion and exclusion criteria of the epidemiological VetCompassTM study. Adapted from Buckland et al. (2016)

	Inclusion criteria	**Exclusion criteria**
Antimicrobial event	An electronic record of the dispensation and administration of medicines that destroy or inhibit the growth of bacterial microorganisms and authorised for systemic use (i.e. injectable, tablets/capsules and oral suspensions)	An electronic record for the dispensation and administration of other antimicrobial agents (e.g. antiviral, antifungal, biocides) or those be delivered topically (e.g. medicated creams, topical solutions for treatment of eye or ear infections).
Dog	Dogs with a unique patient identifier who had at least one electronic patient record entry.	Dogs without a unique identifier or groups of dogs included under a single unique identifier.
Clinic	First opinion clinics situated in the United Kingdom and participating in VetCompassTM during the study period.	Clinics engaged in the provision of solely referral and/or emergency care services. Clinics belonging to veterinary groups with five or fewer clinics

Supplementary material 2. Topic guide for interviews with veterinarians

Introduction
- Thank interviewee.
- Describe the study and confirm participant agrees with the use of the digital recorder.
- Reassure them data will be treated confidentially and any quotes will be anonymised.
- Informed consent.

The following should act as prompts only to guide the conversation. The researcher should follow a flexible approach.

Background
- How did you come to work here?
- Can you tell me about the veterinary practice?
- What laboratory/ diagnostic technologies does the practice have access to?

Antibiotic Resistance
- What do you understand by the term antibiotic resistance?
- What do you understand by antibiotic stewardship or guardianship?
- Do you think antibiotic use in pets plays a role in the global problem of antibiotic resistance?

Guidelines/ Policies
- Does the practice have any in house guidelines regarding antibiotics use/selection?
- Do you use/are you aware of any other guidelines or policies?
- How relevant are they to your everyday practice?
- Do you use any other information sources?
- Do you have any unanswered questions about antibiotic use?

In the clinic
- Do pet owners often seek antibiotics? How do you manage these requests?
- Do you use culture and sensitivity testing often?

Finishing off
- Is there anything else you would like to say about antibiotic use in pets?
- Thank you

General probes/prompt:

- Could you tell me a bit more about that?
- What do you mean by….
- How did you find that experience?
- How did that make you feel?
- (adjectives) – why/what was it you found e.g. scary…

Supplementary material 3. Dog and clinic characteristics of the antimicrobial events in the epidemiological VetCompass™ study and comparison by veterinary group (n = 468,665) (No.: Number; IQR: Interquartile Range)

Antimicrobial event characteristics	Total No.		Group A No.		Group B No.		Group C No.		p-value
Median dog age, years (IQR)	464,681	4.3 (1.5;8.2)	25,898	6.1 (2.6;9.8)	147,293	4.8 (1.8;8.6)	291,490	4.0 (1.3;8.0)	<0.001
No. in bitches (%)	466,176	217,141 (46.6)	25,892	11,706 (45.2)	148,550	69,461 (46.8)	291,734	135,974 (46.6)	<0.001
No. in crossbreeds (%)	464,705	95,617 (20.6)	25,889	4,182 (16.2)	148,321	31,043 (20.9)	290,495	60,392 (20.8)	<0.001
No. in England (%)	468,221	428,356, 91.5	25,465	25,465, 100.0	148,740	137,030, 92.1	294,016	265861, 90.4	<0.001

Supplementary material 4. Intraclass correlation (ICC) estimates of an antimicrobial event comprising of an HPCIA within individual i) dogs and ii) clinics (No: Number; ICC: Intraclass correlation; CI: Confidence interval; HPCIA: Highest Priority Critically Important Antimicrobial)

Model	No. Anti-microbial events	Dogs nested within clinics		Clinic	
		ICC (95% CI)	Standard error	ICC (95% CI)	Standard error
Model 1: Main model – all events	458,599	0.710 (0.701;0.719)	0.004	0.089 (0.076;0.104)	0.007
Model 2: Dogs with multiple events only	324,315	0.727 (0.718;0.735)	0.005	0.086 (0.073;0.101)	0.007
Model 3: Any use of HPCIA measured at a dog level[a]	-	-	-	0.105 (0.089;0.123)	0.009

[a]n = 234,539