Practical Steps Toward Antimicrobial Stewardship for the General Practitioner

Casey Cazer, DVM, PhD[a,b,*], Amelia Greiner Safi, PhD, MS[b]

KEYWORDS

• Antimicrobial resistance • Antimicrobial use • Behavior • Tools • Recommendations • Antimicrobial stewardship

KEY POINTS

- Self and practice assessments around factors relevant for antimicrobial use (AMU) and antimicrobial resistance can help identify areas where change is needed at individual and organizational levels.
- Selecting the right patient, drug, dose, frequency, and duration for AMU requires aligning prescribing with evidence-based guidelines, prioritizing first-line antimicrobials and avoiding drugs important to human health.
- Interventions ranging from simple to substantial change at the individual and organizational levels can help small animal veterinarians practice antimicrobial stewardship.
- Veterinarians are not expected to design new plans from scratch; widely available guidelines, checklists, diagnostic frameworks, and client communication tools can support confident and judicious AMU decisions in general practice.

INTRODUCTION

In 2021, over 1 million people died because of bacterial antimicrobial resistance (AMR); the death toll is expected to grow to 2 million annually by 2050.[1] AMR predates modern antibiotics, as bacteria use antimicrobial compounds to compete with each other, driving the evolution of AMR mechanisms.[2] The clinical use of antibiotics to prevent, control, and treat disease in humans, animals, and plants accelerates the evolution and selection of resistant bacteria and resistance genes both of which can move among host species and reservoirs.[3] As cats and dogs receive more veterinary care and have become family members rather than companions or pets, there is a growing risk of AMR pathogens threatening pet health and human health. For example, there

[a] Department of Clinical Sciences, Cornell University College of Veterinary Medicine Ithaca, NY, USA; [b] Department of Public and Ecosystem Health, Cornell University College of Veterinary Medicine, Ithaca, NY, USA
* Corresponding author. Department of Clinical Sciences, 930 Campus Road, Ithaca, NY 14853.
E-mail address: clc248@cornell.edu

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Abbreviations	
AMR	antimicrobial resistance
AMU	antimicrobial use
AVMA	American Veterinary Medical Association

have been several recent outbreaks in veterinary hospitals of bacteria resistant to carbapenems, *which are considered antibiotics of last resort;* in one case, carbapenem-resistant bacteria from pets infected animal owners.[4,5] Therefore, companion animal veterinarians should renew their investments in antimicrobial stewardship to minimize the development and spread of AMR in their patients and to their clients.

Multiple frameworks and definitions of antimicrobial stewardship exist for veterinary medicine.[6–10] Across these, the common goal is to maintain the efficacy of antimicrobials for treating humans and animals by using antimicrobials judiciously and aligned with evidence-based best practices. Most stewardship recommendations distill into principles of (1) preventing infections and other diseases that may necessitate antimicrobial use (AMU), (2) using antimicrobials only when they are needed to prevent, control, or treat disease, optimizing AMU regimens for maximal clinical efficacy with minimal risk of AMR, (3) prescribers and professions taking responsibility for appropriate AMU, and (4) adopting a systems approach for continual review and improvement.

This article will follow the antimicrobial stewardship principles outlined by the American Veterinary Medical Association (AVMA): commit to stewardship, advocate for a system of care to prevent common diseases, select and use antimicrobials judiciously, evaluate AMU, and educate and build expertise while building in examples and tools from recent research and practice.[9]

Advancing Care by Incorporating Social and Behavioral Science

To help individuals and practices, this article uses both behavioral and implementation science lenses. AMU is at its core a set of behaviors, attitudes, and beliefs that exist for both individual prescribers, clients and practices. Social and behavioral science—decades of research on how and why people make decisions, with a particular focus on barriers to change—can help inform efforts to advance stewardship. A systems approach considers not only individual beliefs, practices and attitudes, but also contextual influences (eg, patient and client attributes, burnout) and structural factors (eg, availability of alternatives, testing cost and turnaround time).

Changing the collection of prescriber and client behaviors around AMU requires interventions that are responsive to context and needs. Implementation science involves a particular focus on understanding stakeholder views, what is necessary to make an intervention successful and sustainable, and testing prior to full implementation.[11] While these approaches are not unfamiliar to veterinary medicine, their incorporation could further benefit the field.[12]

This behaviorally informed approach was employed in a recent study with veterinarians about cefovecin use.[13,14] That study revealed several key themes around stewardship that are already being used to design interventions to address specific needs raised. While conducting formal research on one's own behaviors or practice is generally not practical, **Table 1** and the following discussion provide an accessible self- or practice-level assessment informed by behavioral science. This assessment is to be used in conjunction with the more detailed *Veterinary Checklist for Antimicrobial Stewardship* from AVMA.[15]

Table 1
Rapid assessment of practice, beliefs, and culture around antimicrobial stewardship

Domain	Sample Questions
Individual-level perceptions, decision making, and practices specific to prescribing and AMU	Familiarity with current AMU guidelines (Y/N)
	Do prescribing practices align with current AMU guidelines (Always, Often, Rarely, Never)
	Awareness of which antibiotics tend to be overused in this type of practice (Y/N)
	Awareness of which procedures are most often associated in improper AMU (Y/N)
	Familiarity with which medications are of most concern for AMR (Y/N)
	How severe a threat is AMR in one's practice? (Severe, Concerning, Not concerning)
	Is burnout impacting prescribing? (Y/N)
	Awareness of which situations require diagnostics to reduce AMU (All, Most, Few, None)
	Individual use of diagnostics and whether they are used in most relevant situations for AMU (Always, Often, Rarely, Never)
Interpersonal and client interactions	Are there struggles in responding to pressure from clients to use an antimicrobial? (Always, Often, Rarely, Never)
	Do assumptions about client abilities (instead of conversations) impact AMU? (Always, Often, Rarely, Never)
	Are there conversations with clients about success in giving medications to patients? Demonstrations? (Always, Often, Rarely, Never)
	Are there discussions about AMR and AMU decisions with clients? (Always, Often, Rarely, Never)
	Do you have advice on how to respond to pressure from clients? (Y/N)
Materials for clients	Visual explanation of AMR (Y/N)
	Visual explanation of AMR transmission between patient and client (Y/N)
	Visual explanation of diagnostics/culture and sensitivity testing to clients (Y/N)
Training and education for veterinarians	What trainings related to AMR and AMU have been useful? What do you still need?
	What questions do you have about AMR?
	Are trainings and resources shared among colleagues? (Y/N)
Resources at practice	Are supports for clients readily available (ie, to help pill a cat)? (Y/N)
	Do medications on hand align with AMR stewardship? Is the majority of what is available first line? (Y/N)

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Table 1
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Domain	Sample Questions
Practice culture around AMR	Has an explicit commitment to AMR stewardship been made? (Y/N)
	Has a commitment been publicly communicated to clients? (Y/N)
	Is the *Veterinary Checklist for Antimicrobial Stewardship* or other stewardship framework guiding conversations? (Y/N)
	Is there a stewardship champion or committee? (Y/N)
	Is there a forum or opportunity for discussion within practice about AMU and AMR? (Y/N)
	Is the use of last-resort or high-tier drugs tracked? (Y/N)

Abbreviation: Y/N, yes/no.

DISCUSSION

Aim 1: Commit to Stewardship

Commitment to antimicrobial stewardship begins with making stewardship an explicit priority, personally and, ideally, at the practice level. Commitments for an individual veterinarian or practice that communicate stewardship intentions to clients can include[15,16]: deciding to consistently follow published AMU guidelines for common conditions, taking time to communicate with clients about AMU decisions, posting an antimicrobial stewardship commitment or poster in examination rooms, and adding a brief stewardship statement to the clinic website.

Although a single study of stewardship posters in veterinary clinics found that few clients remembered the message of the poster,[17] posters can also serve as a reminder to clinicians and provide an opportunity for a talking point during clinical encounters when a client may request antimicrobials.

Identifying an antimicrobial stewardship champion or starting a practice antimicrobial stewardship committee is the next step in turning a commitment to stewardship into action.[15,16] Ideally at least one veterinarian is a champion or serves on the committee, but veterinary technicians, assistants, or other staff who are interested and invested in antimicrobial stewardship can also be effective champions. *Importantly, commitment does not require perfection or sweeping policy changes. Identifying 1 or 2 priority areas, such as reducing routine use of long-acting injectables, improving adherence to first-line drug choices, or increasing use of diagnostics before prescribing, can make stewardship feel achievable rather than overwhelming.* The stewardship committee or champion can develop protocols or provide education to other staff and clinicians around these priorities,[15,16] monitor progress over a set time period, and report back to the entire practice on improvements.

Aim 2: Prevent Common Diseases

Preventing disease is one of the most effective antimicrobial stewardship strategies: *every avoided infection is an avoided antibiotic prescription.* However, the impact of preventive and wellness care in stewardship is often overlooked. As illustrated in **Fig. 1**, many of the conditions that result in AMU in companion animals are downstream consequences of preventable problems:

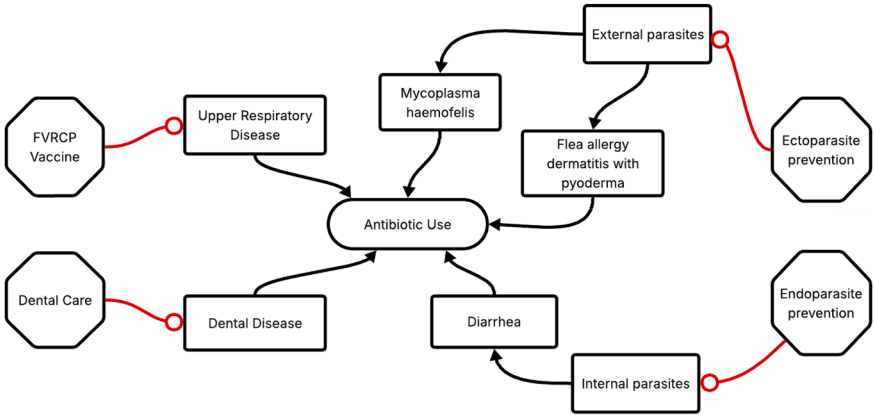


Fig. 1. Schematic of how preventive care can reduce AMU in cats. Preventive care interventions are in hexagons, connected to diseases they prevent by red lines with circle heads. Diseases or infections are connected to downstream clinical consequences with black arrows. AMU, antimicrobial use.

Routine vaccination reduces the incidence and severity of upper respiratory disease, which is often treated with antimicrobials;
Consistent ectoparasite and endoparasite prevention can prevent dermatitis and diarrhea, respectively, eliminating 2 common drivers of antimicrobial treatment;
Prophylactic dental care can reduce periodontal disease, which may result in AMU as an interim or quality of life intervention if clients do not pursue comprehensive oral health treatments.

Preventive care conversations may feel tangential to stewardship, but they are central to it; by prioritizing vaccines, parasite prevention, dental health, nutrition, and husbandry, veterinarians can reduce the number of future diseases in which antibiotics are considered or required.

Veterinary practices should also implement proper and consistent infection prevention and control strategies. High-yield strategies include excellent hand-hygiene, thorough environmental cleaning and disinfection, and thoughtful use of personal protective equipment and patient isolation.[18] Strategic implementation can limit hospital and clinic-associated spread of both highly transmissible pathogens (eg, *Bordetella*, viral infections) and AMR pathogens (eg, methicillin-resistant *Staphylococcus pseudintermedius*).

Aim 3: Select and Use Antimicrobials Judiciously

Most discussions and interventions related to antimicrobial stewardship focus on decisions clinicians make when prescribing antimicrobials. Several mnemonics or frameworks can help clinicians make judicious AMU decisions.

The 5 "rights" of medication safety have been adapted to antimicrobials: right patient and indication, right drug, right dose, right time, and right duration.[19,20]

Others advocate for the 5 "D's": disease: drug, dose, drug-route, duration, and de-escalation.[21]

In addition to remembering which domains to consider, clinicians also want more guidance in these decisions.[22] The sections below provide some of that guidance.

Right patient and indication

The first decision of AMU is determining if the patient has the right disease or indication for antimicrobial therapy. Many of the most common reasons for prescribing systemic antimicrobials in companion animals (listed below) are either unassociated with infection or frequently resolve with non-antimicrobial or topical antiseptic therapy, yet antibiotics are still frequently prescribed "just in case."[23,24]:

Feline lower urinary tract disease and subclinical bacteriuria[25]
Mild upper respiratory disease[26]
Acute diarrhea or gastroenteritis[27]
Clean surgical procedures[28]
Surface and superficial pyoderma[29]

Any antimicrobial therapy increases selective pressure for AMR within the treated animal and puts the animal at risk for adverse effects from the antimicrobial; "just in case" antimicrobials incur these risks without any evidence of benefit to animal health. Therefore, carefully approaching the decision to use antimicrobials in the first place is critical to preventing unnecessary AMU.

Use of diagnostics. Rapid, cost-effective, in-house diagnostics such as cytology and urinalysis can often provide sufficient information to avoid unnecessary AMU, particularly for skin, ear, and urinary diseases.[30] However, diagnostic test results should always be integrated with other clinical findings. For example, subclinical bacteriuria, characterized by the presence of bacteria in urine without clinical signs of urinary tract disease, regardless of the presence of pyuria or hematuria, should generally not be treated with antimicrobials.[25,31]

Clinicians should escalate their diagnostics based on information gathered from in-house diagnostics and the clinical picture, for example:

Finding rods within neutrophils on an impression smear of a skin lesion should prompt a veterinarian to strongly recommend a culture and susceptibility test because many gram-negative rods can have high levels of multidrug resistance.[29]

Cultures should be interpreted with the context of cytology results, particularly in the case of multiple organisms isolated from a culture.[29]

Culture and susceptibility testing should be strongly recommended when infections are recurrent, severe, non-responsive to empirical therapy, or when resistant pathogens are a concern.[30]

The biggest barriers to submitting culture and susceptibility tests in veterinary medicine are cost and time.[14] Emerging genomics-based bacterial identification and antimicrobial susceptibility technologies offer promise for faster and cheaper results, but they have not been validated in veterinary settings and should be used with caution. Detection of bacterial DNA or resistance genes does not necessarily indicate active infection or predict clinical outcomes, and these tests may identify organisms or resistance genes unrelated to the patient's disease process.[32]

Pressure from clients about antimicrobial use. Even when using diagnostic testing and clinical findings to assess the need for antimicrobials, pressure from clients to prescribe an antibiotic can impact decision making. This pressure comes from an expectation that they "leave with something," a belief that it has worked before, or that this is the only option available. When this pressure intersects with veterinarian burnout, a concern that the client will go elsewhere, or a rushed appointment schedule, following AMU guidelines can be more challenging.

These are real and understandable challenges to implementing antimicrobial stewardship best practices, and part of the reason discussion of such issues can be helpful

in changing behavior. Veterinarians who have grown confident responding to client pressure recommended the following approaches (adapted with permission of the authors)[13,14]:

On anticipating concerns: "I've usually explained to [the owner] why I'm not giving [antibiotics] before they have a chance to say that they were expecting to get one. I'm anticipating what's going to happen and getting right into [explaining that] these are viral [infections], [there is] nothing we can do to make [it] go away. We can do supportive care."

On explaining why an antibiotic is not appropriate and giving the client alternatives to take home: "I think it really is helpful for the clients to understand why we're saying no … there are other things in that scenario that we are often offering the patient and the client as treatments that are not antibiotics. I think both of those really help the client get off of the antibiotic train if you can offer them something different that will be appropriate and will help the patient and explaining to them why we're not using antibiotics."

Framing the benefits of a "wait and see" approach (ie, delayed prescribing): "I try to say to my clients, 'You don't necessarily have to come back if you end up needing an antibiotic, you can call me.' I'm not going to demand you come for an in-person recheck and make your cat go in the car again and puke in the carrier and you take off time from work just to get to the antibiotic. If you need it in 2 days, 3 days, 5 days, whenever this infection shows up, you can call me."

Ultimately, selecting the right patient and right disease for AMU means: being comfortable withholding antibiotics when diagnostics or clinical signs do not support their use, clearly communicating this rationale to clients, and recognizing that "no antibiotic today" is sometimes the most appropriate and responsible stewardship and clinical decision.

Right drug

Selecting the right antimicrobial means choosing the narrowest-spectrum, most appropriate drug that is likely to be effective for the suspected pathogen, host species, and infection site. In most companion animal cases, this means reaching first for recommended first-line antimicrobials rather than newer or broader-spectrum options. Drugs that are critically important to human medicine, including third-generation cephalosporins (eg, cefovecin, cefpodoxime) and fluoroquinolones (eg, enrofloxacin, marbofloxacin, pradofloxacin), should be reserved for situations where first-line options are unlikely to be effective or have already failed, and when their use is supported by culture and susceptibility results.[6,33] Some drugs, including carbapenems (eg, imipenem, meropenem), vancomycin, linezolid, and other advanced antimicrobial classes, should arguably not be used in animals at all or only under the guidance of veterinary infectious disease experts because of their critical importance for treating life-threatening infections in humans.[6,33]

Empirical antimicrobial selection, meaning without culture and susceptibility test results, is often necessary in companion animal practice due to cost and time constraints. Empirical drug choices should be informed by: peer-reviewed and expert guidelines that recommend empirical, first-line antimicrobials for common conditions in dogs and cats,[25,29,30,34,35] local susceptibility patterns (ie, antibiograms) when available, and the clinical context of the patient.

Antibiograms are cumulative reports of susceptibility for common bacterial pathogens, which can help clinicians make appropriate first-line, empirical antimicrobial choices.[36,37] In some veterinary contexts, antibiograms have revealed that one first-line antimicrobial is more likely to be effective than another, or that there is frequent

resistance to first-line antimicrobials and therefore culture and susceptibility testing should be prioritized for certain infections.[37,38] However, antibiograms are infrequently available for companion animal practice. Veterinarians can contact their microbiology laboratory to see what cumulative susceptibility data are available for their region to help guide their empirical AMU and culture decisions.

When culture and susceptibility testing is performed, results should guide antimicrobial selection but not in isolation. Veterinarians must also consider:

Is the selected "susceptible" drug appropriate for the infection site and patient?

Is the selected "susceptible" drug aligned with stewardship principles (ie, not a drug that should be reserved for human use)?

The complete clinical picture; if an animal was treated empirically with drug that tested "resistant," but the animal's clinical signs have resolved, then there is likely no need to put the animal on a different "susceptible" antimicrobial.

A complete discussion of how to properly collect and interpret culture and susceptibility test results is beyond the scope of this article, but veterinarians are encouraged to review information provided by the American College of Veterinary Microbiologists,[39] Clinical and Laboratory Standards Institute,[40] and veterinary microbiology experts.[41] Veterinarians should contact their microbiology laboratory for consultation on challenging infections or susceptibility test reports showing resistance to first-line antimicrobials.

Formulation. Part of the "right drug" consideration is what formulation best works for the client, especially if the first-line antimicrobial comes in different formulation options than higher-tier antimicrobials. In previous work, cat owners report finding it easier to give liquid medication to cats compared with pills. While a number of cat owners indicated that it was difficult or very difficult to provide either formulation, only a small percent deemed it impossible.[13] In contrast, veterinarians tended to assume both that a *greater proportion* of clients struggled to medicate their cats and that those struggles were more severe.[13] These perceptions matter, especially since many cat owners reported not getting guidance from their veterinarian or technician on how to pill a cat nor do they get information on which medication is less likely to lead to challenges with AMR.[13]

If a client is assumed to be unable or uninterested in medicating their pet (with a first-line drug), then this assumption paves the way for higher-tier injectable medications like cefovecin to be used instead.[13] Based on interviews, these assumptions about client inability to medicate their pets were more pronounced for clients who are older women.[13] However, when given details about AMR, cat owners often changed their antimicrobial preference from cefovecin to amoxicillin.[13]

These estimations of client interest and ability may be accurate, but 3 actions can lead to better stewardship: asking the client about their interest in medicating their pet, and explaining why medication choice is relevant for AMR, and providing a demonstration on how to medicate a pet, particularly cats.

Right dose, duration, and time

Even when the correct antimicrobial is selected, inappropriate dosing, frequency, or duration can undermine clinical success and drive AMR.[40] Dosing regimens that are supported by evidence, whether from clinical trials, pharmacokinetic/pharmacodynamic principles, or consensus guidelines, should be used whenever possible. In particular, when culture and susceptibility testing is used to guide therapy: it is critical to match the prescribed dose and dosing interval to the regimen used to establish the susceptibility breakpoint for that specific organism, antimicrobial drug, host species,

and infection site[40]; deviation from these regimens can result in drug exposures that are insufficient to achieve the expected clinical effect, despite a reported "susceptible" result.[40]

The regimens correlated with a "susceptible" result can be found in Clinical and Laboratory Standards Institute tables and are also available in a mobile application.[34,40,42]

Duration of therapy is receiving increased attention in human and veterinary medicine. *Most treatment lengths were adopted without robust evidence and frequently defaulted to multiples of weeks* (eg, 7, 14, or 21 days) or number of fingers on a hand (eg, 5 or 10 days).[43] Veterinarians may not be aware of recent advances in evidence for duration of antimicrobial therapy, even as shorter regimens are slowly making their way into clinical guidelines:

The dogma that preventing the emergence of AMR required longer courses of antimicrobials or needing a patient to finish a course of antimicrobials *has little to no basis in scientific evidence*.[43,44]

Unnecessarily long exposures to antimicrobials have no benefit to the patient and only risk emergence and spread of AMR pathogens and adverse effects.[43]

New data from clinical trials support shorter durations of AMU in veterinary and human medicine for many diseases, such as urinary tract infections and pneumonia.[25,43,45]

Veterinarians should use the shortest effective duration of AMU and frequently reassess the need to continue treatment based on the patient's condition; this balances the need for effective treatment with the stewardship responsibilities related to judicious AMU.

Aim 4: Evaluate Antimicrobial Use Practices

Evaluating AMU practices is an essential component of stewardship, so that veterinarians can make evaluate their progress on stewardship priorities and continue to make data-driven improvements. Unfortunately, it can be challenging for individual veterinarians or practices to extract and aggregate AMU data from their electronic medical records. A spreadsheet-based tracking tool for individual veterinarians and practices is available from the University of Minnesota.[46]

Large-scale studies of US veterinary practices have shown that first-line antimicrobials are selected for common conditions only about half to three-quarters of the time, with frequent deviations from recommendations in drug choice, dosing, and duration.[23,47–49] *These studies also highlight persistent overuse of antimicrobial classes that are critical for human health, particularly in cats*.[23,24,47,48] The goal of evaluating current AMU practices is not to assign blame, but to use these data as benchmarks and milestones that help veterinarians reflect on their own prescribing patterns. Even small changes, such as increasing adherence to first-line drug recommendations, shortening treatment durations, or increasing use of in-house diagnostics, can result in meaningful improvements at both the patient and population level.

Aim 5: Educate and Build Expertise

Antimicrobial stewardship is not something veterinarians are expected to do in isolation, and a wide range of resources are available to support evidence-based AMU decision-making (**Table 2**):

The Path Forward

Building stewardship expertise does not require becoming an infectious disease specialist; rather, it involves routinely engaging with available guidance, staying

Table 2
Selected resources for companion animal antimicrobial stewardship and evidence-based antimicrobial use

Resource	Format	Summary
AVMA Veterinary Checklist for Antimicrobial Stewardship[15]	Checklist	Detailed steps to take that are aligned with the AVMA principles of antimicrobial stewardship. Includes "antimicrobial time outs."
AAFP/AAHA Antimicrobial Stewardship Guidelines[10]	Consensus guideline	Stewardship framework for feline practice, with bullet-point practical tips for judicious antimicrobial use.
ISCAID Infection-Specific Treatment Guidelines[25,26,29]	Peer-reviewed clinical guidelines	Evidence-based antimicrobial selection and diagnostic recommendations for common conditions (urinary tract infections, pyoderma, respiratory disease). Highlights first-line antimicrobial therapy, diagnostics, and appropriate duration.
CLSI VET01S[42]	Standards document and digital tables	Defines veterinary-specific antimicrobial breakpoints and the antimicrobial regimens used to establish them. Free online access to main tables for breakpoints and antimicrobial regimens.
CLSI VET09[40]	Textbook	Guidance document for veterinarians on interpreting and using culture and susceptibility testing to select antimicrobials. Specific chapters on dogs and cats.
Ontario Veterinary College Firstline App[34]	Mobile application	Point-of-care antimicrobial decision aid incorporating expert guidance and CLSI-supported dosing regimens for common companion animal infections.
University of Minnesota Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings[16]	Digital reference	Comprehensive handbook with basic, intermediate, and advanced stewardship suggestions and resources, aligned with AVMA principles of antimicrobial stewardship.

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Table 2
(*continued*)

Resource	Format	Summary
BSAVA PROTECT ME Poster[30]	Poster with tables	Point-of-care antimicrobial decision aid with diagnostic recommendations, first-line antimicrobials, dosages, and durations for common indications in dogs and cats. Note that antimicrobial availability may differ between North America and the United Kingdom.
AVMA "Does This Cat/Dog Need Antibiotics?" Handouts[35,50]	Tables	Concise tables of common diseases in dogs and cats indicating when antimicrobials are needed, diagnostic recommendations, and first-line antimicrobial drugs, dosages, and durations. Requires AVMA membership for access.

National and international guidelines on AMU for specific diseases.[10,25,26,29]
Educational resources about diagnostic testing and antimicrobial stewardship frameworks[15,16,40,42]
Point-of-care tools, including checklists, mobile apps, and prescribing algorithms[30,34,35,50]

current as recommendations evolve, and using trusted resources to make AMU decisions that help individual patients while preserving the efficacy of antimicrobials for animals and humans in the long term.

The guidance in **Tables 1** and **2** can help provide a sense of where to start. To address AMR, individual, organizational, and structural changes are needed. The assessment in **Table 1** identifies individual and practice-level factors over which veterinarians have more agency.

- Honestly assessing how one's own practices align with current guidelines
- Considering whether assumptions influence AMU decisions
- Building a culture of talking about AMR with patients
- Deciding what medicine to keep on hand matters for prescribing. Prioritize first-line medications and avoid stocking more advanced medications.
- Pursing continuing education specific to AMR
- Empowering and educating support staff, including licensed veterinary technicians, to assist with client communications and stewardship

Larger structural factors summarized here and elsewhere remain important to advocate for:

- Reduced costs for culture and sensitivity tests
- Faster turnaround times for such tests
- Additional palatable formulations or injectable options for first-line drugs
- Easy AMU reporting integrated within electronic veterinary record systems
- Development and publication of antibiograms by national and regional diagnostic laboratories

SUMMARY

Antimicrobial stewardship in companion animal practice is both a clinical responsibility and an opportunity to improve patient care and overall animal and human health through minimization of AMR. Stewardship does not require rigid protocols or idealized conditions, but rather thoughtful, evidence-based decisions made consistently in everyday practice. By emphasizing disease prevention, careful assessment of whether antimicrobials are truly indicated, prioritization of first-line drugs, and optimization of dose, frequency, and duration, veterinarians can substantially reduce unnecessary AMU while maintaining excellent clinical outcomes. Importantly, stewardship is influenced not only by individual knowledge but also by behavioral, interpersonal, and structural factors, including client expectations, diagnostic accessibility, time pressure, and practice culture. Addressing these realities through reflection, communication strategies, and use of available tools allows stewardship to be both feasible and sustainable. Small, incremental changes made by individual clinicians and reinforced at the practice level can accumulate into meaningful progress, helping to preserve antimicrobial effectiveness for future patients.

CLINICS CARE POINTS

- Many common diseases, even with potential infectious causes, do not require antibiotics, such as feline lower urinary tract disease, mild upper respiratory disease, acute diarrhea, and clean surgical procedures.
- In-house diagnostics and careful physical examination frequently provide enough information to avoid unnecessary AMU or to justify escalation to culture and susceptibility testing.
- Prioritize prevention as antimicrobial stewardship. Vaccination, parasite prevention, dental care, and husbandry reduce common downstream conditions that frequently trigger antimicrobial prescribing.
- Choose first-line antimicrobials whenever possible. Narrow-spectrum drugs are often effective, better supported by evidence, and less likely to drive AMR than broader-spectrum or higher-tier options.
- Avoid antimicrobials important to human health, including 3rd generation cephalosporins and fluoroquinolones, unless their use is supported by culture and susceptibility results.
- Interpret culture and susceptibility results in clinical context. A "susceptible" result does not mandate.
- Match dose, frequency, and duration to evidence-based regimens. Shorter durations are often sufficient for clinical treatment and reduce exposure to unnecessary antimicrobials.
- Use self-level and practice-level assessments to guide stewardship efforts. Periodically reviewing individual beliefs, prescribing habits, client interactions, and practice culture can help identify realistic, high-impact targets for change.
- Design systems that make the right choice the easy choice, including structural changes such as stocking first-line formulations, public commitments to stewardship, and prepared communications around AMU and AMR.

DECLARATION OF AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, CC used Microsoft CoPilot, a generative artificial intelligence tool, to assist with drafting some components of this article. The authors take responsibility for the content of the final article.

DISCLOSURES

The authors have nothing else to disclose.

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