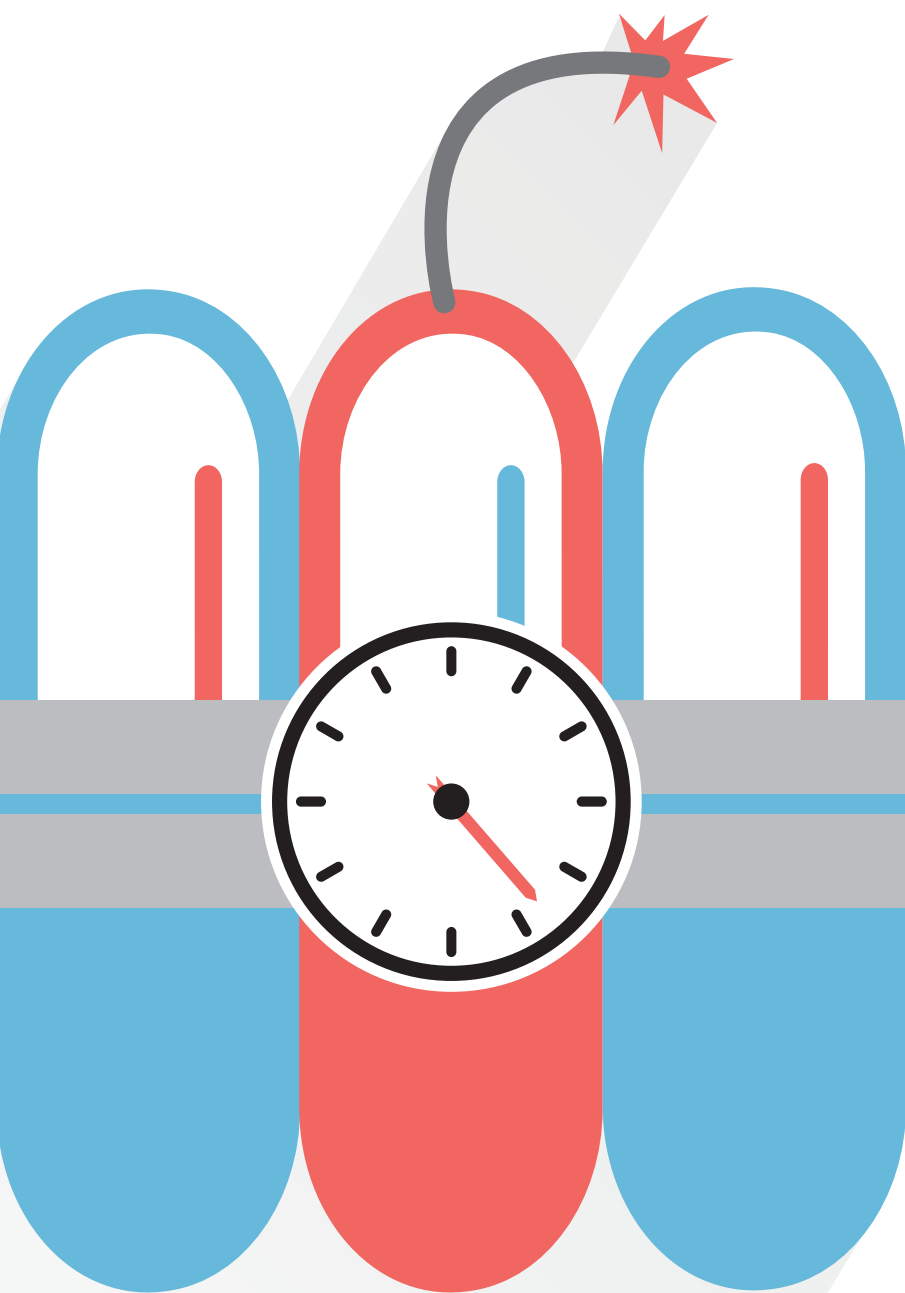


TEACHING TARGET
ENSURE ALL TEAM MEMBERS FULLY
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PERSONALLY MAKE ON THE MEDICAL OUTLOOK
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Antibiotic Resistance: THE VETERINARY FIGHT AGAINST A POST-ANTIBIOTIC ERA

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Antibiotics have revolutionized human medicine, veterinary medicine, and even food production since their introduction in the mid-20th century—not really so long ago. Antibiotics save lives and prevent illness in both people and animals; however, for antibiotics to continue to work and provide their benefits, physicians and veterinarians need to be smarter about antibiotic use—and there is no time to lose.

Antibiotic Resistance

Whenever an antibiotic is used in a human or another animal, the bacteria susceptible to that drug are inhibited or killed off and the resistant ones survive. Natural selection and survival of the fittest are similar concepts that are at work here; the antibiotic-resistant bacteria are rapidly being selected for survival through frequent antibiotic use. When susceptible bacteria are wiped out, resistant ones are able to grow and multiply, and the antibiotic that had been

used will no longer be effective. Unfortunately, reducing antibiotic use to reverse the trend may take much longer than the rapid selection of resistant bacteria that may occur every time an antibiotic is used.

Some bacteria can also share the genes that make them resistant. Superbugs often have accumulated large sets of these genes, making them resistant to most antibiotics and leaving little or no way to treat the infected patient. As superbugs become more common, even a simple infection (eg, from a cut or scrape) could possibly be fatal because no drugs can help control it. Medical procedures (eg, surgery, cancer therapy)

TABLE 1 | **Categorization of Antibiotics by Importance to Human Medicine***

Category of Importance to Human Medicine	Antibiotic Class	Examples	Alternatives
I – Very High (should be used most sparingly)	Carbapenems Cephalosporins (3rd & 4th generation) Fluoroquinolones Glycopeptides Penicillin- β -lactamase inhibitor combos Polymixins	imipenem, meropenem cefotaxime, ceftazidime enrofloxacin, orbifloxacin vancomycin amoxicillin & clavulanic acid polymixin B, polymixin E (colistin)	Few to none
II – High	Aminoglycosides Cephalosporins (1st & 2nd generation) Macrolides Penicillins	amikacin, kanamycin cephalexin erythromycin, tylosin penicillin G, ampicillin	Usually
III – Medium	Bacitracins Phenicol Sulphonamides Tetracyclines Pleuromutilins	bacitracin florfenicol variety of sulfa-drugs chlortetracycline tiamulin	For some
IV – Low	Ionophores Flavophospholipols	monensin, lasalocid bambermycin	N/A

*According to Health Canada, based on a similar categorization by the World Health Organization (WHO); http://www.hc-sc.gc.ca/dhp-mps/vet/antimicrob/amr_ram_hum-med-rev-eng.php

As superbugs become more common, even a simple infection could possibly be fatal because no drugs can help control it.

that rely on antibiotics' effectiveness to prevent infection would also become extremely risky. Essentially, the pre-antibiotic era—prior to the 1940s, before antibiotics were first used and bacterial infections were the leading cause of death—would return and the post-antibiotic era would begin.

Veterinary Involvement

By the numbers, most antibiotic use in North America is in agriculture (livestock), followed by human health care in both hospital and community settings.^{1,2} The volume of antibiotics used in companion animals is very small compared with agriculture, but the drugs are often similar or the same as those used in human health care because they are effective against a broader spectrum of bacteria, have fewer adverse effects, can be given less frequently or in a smaller volume, or come in an easier form (eg, oral vs injectable).

Even if the infection is cured, using these critically important antibiotics frequently increases the risk for pets carrying superbugs as part of their normal flora—for example, in their intestinal or urinary tracts, on their skin, or in their noses.³⁻⁵ Animals,

like humans, can carry these bacteria and show no signs of illness but still transmit them to humans or other animals. A number of studies have clearly demonstrated how owners and pets can share bugs such as methicillin-resistant staphylococci and *E coli*.^{6,7} If a person or pet carrying these superbugs gets sick or injured or has surgery, the bugs can move in and cause an infection that is extremely difficult to treat.

Fighting Resistance

Antibiotic resistance is a perfect example of a One Health issue—to fight the resistance, everyone must work together to reduce the use of these drugs in humans, other animals, and the environment. Important first steps include increasing veterinary oversight so clients can no longer buy these drugs over the counter and controlling internet pharmacy sales and drug importation.

The AVMA has been working to provide guidance and resources to veterinarians and pet owners, including developing practice guidelines for small animal veterinarians. Also, the ACVIM has produced an excellent consensus statement on this topic (see **Veterinary Guidelines**).

Veterinary Guidelines

- The AVMA convened a Task Force for Antimicrobial Stewardship in Companion Animal Practice to help develop practice guidelines for small animal veterinarians. These guidelines help veterinarians make antibiotic choices that consider not only the needs of the patient currently being treated but also the needs of future patients (see **Resources**, page 23). They have put together a resources page that includes:
 - New quick-reference materials on antibiotic do's and don'ts for dogs and cats
 - Client education posters
 - Links to antibiotic use guidelines from other prominent associations (eg, International Society for Companion Animal Infectious Diseases [ISCAID; iscaid.org]; Federation of European Companion Animal Veterinary Associations [FECAVA; fecava.org]).
- The ACVIM assembled an international group of experts in veterinary infectious diseases, microbiology, internal medicine, and pharmacology and produced the 2015 Consensus Statement on Therapeutic Antibiotic Use in Animals and Antibiotic Resistance (see **Resources**, page 23).

Veterinary Team Brief Antimicrobial Policy

Veterinary Team Brief and Clinician's Brief recently instituted an antimicrobial stewardship policy, adapted from one set by the *Equine Veterinary Journal*. Our policy states:

Authors who provide antimicrobial treatment recommendations must consider the potential impact of veterinary drug use on public health. In particular, authors should avoid recommending extralabel use of fluoroquinolones and extended-spectrum β -lactam antimicrobials (eg, 3rd- or 4th-generation cephalosporins) or recommending drugs such as carbapenems, glycopeptides, and oxazolidinones used for treatment of multidrug-resistant pathogens in humans. When any of these drugs are recommended, there must be specific mention of the relevant issues, and evidence supporting the recommendation must be provided.

Our policy focuses on careful consideration, not prohibition, and we recognize these drugs are clinically indicated in some instances. Authors can still recommend extralabel use of fluoroquinolones, 3rd-generation cephalosporins, and use of other classes such as carbapenems; however, those recommendations should be justified. ■■■

How the Profession Can Help

Veterinary professionals must know when antibiotics are needed and use them wisely (see **Tips for Antibiotic Use**). However, the best way to decrease antibiotic use is by preventing infections. Clients should be educated about their pets, including eating right, exercising regularly, sleeping well, and receiving proper preventive care (ie, vaccinations, deworming), which help boost the natural immunity to infection. They should also know the importance of TLC, which can prevent extra stress

on the patient's immune system, keeping wounds clean and covered, and ensuring prescriptions—including antibiotics—are taken according to directions.

Conclusion

It is crucial that veterinarians demonstrate to the public and policy makers that they are good antibiotic stewards so the profession continues to have access to these drugs for their patients, and their use in animals does not become tightly restricted by new regulations. Every veterinary professional must play a role in

Tips for Antibiotic Use

Follow these guidelines to use antibiotics effectively and only when necessary:

- **Know what is being treated:** Antibiotics only work on bacteria, not viruses, and many conditions are not caused by an infection.
- **Choose the right product:** Do not crack a walnut with a sledgehammer—meaning, avoid using a critically important broad-spectrum antibiotic when a drug that more specifically targets the infection is available. This is often better for the patient and for reducing the risk for resistance overall.
- **Follow instructions:** Make sure the appropriate dose is used, the client can give the drug by the appropriate route, and the patient is treated for the correct length of time. If there is any question, examine the patient again and refill the prescription if longer treatment is needed. Remember that more is not necessarily better, but too little can result in relapses. Either one can promote development of resistance.
- **Follow up:** The only way to ensure the strategies and treatment regimens used regularly are working consistently is to keep track of how patients respond through progress examinations or follow-up phone calls. Regularly review this information and any available data from bacterial culture and susceptibility testing from as many patients as possible to help ensure antibiotics are being used most effectively.
- **Know when to euthanize:** It may sound harsh, but antibiotics should not be used in a futile effort to treat a patient unlikely to survive.

preserving the effectiveness of these very important drugs by using them wisely and appropriately. ■

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Veterinary professionals must know when antibiotics are needed and use them wisely.



TEAM TAKEAWAYS:

Veterinarians: It's not too late to change your prescription protocols and to explain to clients why antibiotics may not be a first choice for treatment.

Nursing Team: The best way to prevent antibiotic overuse is to prevent infections. Take time to educate clients.

Client Care Team: Are clients calling just to refill an antibiotic prescription over the phone? Invite them to make appointments to come to the practice, and take the opportunity to state the practice's policy on antibiotic use and explain why it helps protect the community.

Resources

- American Veterinary Medical Association. Antibiotic use is changing. Talk to your veterinarian. <https://www.avma.org/public/Health/Pages/Antibiotic-Use-Changing.aspx>.
- American Veterinary Medical Association. Guidance for antimicrobial use in companion animal practice. <https://www.avma.org/KB/resources/reference/pages/guidance-for-antimicrobial-use-in-companion-animal-practice.aspx>.
- American Veterinary Medical Association. AVMA Task Force for antimicrobial stewardship in companion animal practice. <https://www.avma.org/about/governance/councils/pages/task-force-for-antimicrobial-stewardship-in-companion-animal-practice.aspx>.
- Centers for Disease Control and Prevention (CDC). Get smart: Know when antibiotics work. <http://www.cdc.gov/getsmart/community/index.html>.
- Federation of European Companion Animal Veterinary Associations (FECAVA). Recommendations for appropriate antimicrobial therapy. http://www.fecava.org/sites/default/files/files/2014_12_fecava_recommmodation%20AM%20therapie.pdf.
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