

Treatment Failure

A. Use Antimicrobials Wisely:

If after treatment evaluation by the veterinarian it appears that the current treatment has failed to resolve the infection, 12 the veterinarian should document the patient’s response and change the therapy. In most cases, 13 a “culture-based approach,” achieved through culture, pathogen identification, and sensitivity testing, should be implemented, 14 and should be used to guide antimicrobial selection; however, in some cases, empirical selection of another primary or secondary use antimicrobial may be justified. Tertiary use antimicrobials should not be used unless the pathogen is properly proven to be resistant to those in the primary and secondary use categories. 15 Proper case follow-up should continue until the animal has cleared the infection. 16 Additional cultures may be necessary to monitor response to treatment. When treating a known or suspected MDR pathogen, bio-security and bio-containment measures should be enhanced to prevent nosocomial and zoonotic transmission.

Table 1. Antimicrobial Stewardship Guidelines Published by Various Professional Organizations

Organization/Title/ Year
American Veterinary Medical Association (AVMA) Judicious Therapeutic Use of Antimicrobials (2008)
American Association of Feline Practitioners (AAFP)/ American Animal Hospital Association (AAHA) Basic Guidelines of Judicious Therapeutic Use of Antimicrobials in Veterinary Medicine (2009)
American College of Veterinary Internal Medicine (ACVIM) Antimicrobial Drug Use in Veterinary Medicine Consensus Statement (2005)
Canadian Committee on Antibiotic Resistance (CCAR) Infection Prevention and Control Best Practices for Small Animal Veterinary Clinics (2008)
Centers for Disease Control and Prevention (CDC) Campaign to Prevent Antimicrobial Resistance in Healthcare Settings (2003)
Food and Drug Administration (FDA) Judicious Use of Antimicrobials (2009)
Expert Advisory Group on Antimicrobial Resistance (EAGAR) EAGAR Importance Ratings and Summary of Antibiotic Use in Humans in Australia (2006)
Federation of Veterinarians of Europe (FVE) Antibiotic Resistance & Prudent Use of Antibiotics in Veterinary Medicine (2000)
Health Canada Categorization of Antimicrobial Drugs Based on Importance in Human Medicine (2009)
World Organization for Animal Health (OIE) OIE List of Antimicrobials of Veterinary Importance (2007)

Table 2. The American College of Veterinary Internal Medicine (ACVIM) Recommended Categorization of Antibiotics

Category	Characteristics
Primary Use	<ul style="list-style-type: none">• Older drugs• Narrower spectrum of coverage• Used for the majority of infections• Can be appropriate for use in critically ill animals• Not necessarily less potent or less useful than other drugs
Secondary Use	<ul style="list-style-type: none">• Newer drugs• Wider spectrum of coverage (compared to Primary)• Have added importance in the treatment of serious or frequently resistant infections in humans• Antimicrobial resistance appears to develop relatively easily• Reserve this class for use when culture and sensitivity results indicate Primary Use drugs not appropriate
Tertiary Use	<ul style="list-style-type: none">• Most recently developed• Broad spectrum of coverage• Drugs that are VERY important for human and animal health care• Useful against the most resistant bacteria• PRESCRIBE ONLY to animals with clinically important infections caused by bacteria that have been demonstrated to be resistant to all reasonable Primary and Secondary Use drugs• Exclusively for use after proper culture and sensitivity results are obtained
Restricted Use	<ul style="list-style-type: none">• Reserved strictly for human application only



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Facts for Companion Animal
Veterinary Professionals about
Prudent Antimicrobial
Use in Companion
Animals to Prevent the
Emergence & Spread of
Multidrug-Resistant
(MDR) Pathogens



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Antimicrobial and Multidrug Resistance

According to the CDC, **antimicrobial resistance** has been described as one of the world's most “**pressing public health problems.**” During the past decade, several important antimicrobials have lost effectiveness in treating common infections. Antimicrobials eliminate sensitive microbes, allowing those carrying resistance mechanisms to persist, grow and multiply, a process known as **selective pressure**. This selective pressure is increased through the misuse and overuse of antimicrobials in both human and veterinary medicine.

It is also important to remember that all organisms in the body are exposed to antimicrobials when used systemically, and resistance factors can be shared between bacterial species. Therefore, nonpathogenic and commensal bacteria can acquire resistance genes and later transfer it to disease causing organisms.

Additionally, the use of antimicrobials over time has contributed to the emergence of **multidrug-resistant (MDR) bacteria**, which are defined as **bacteria resistant to three or more classes of antimicrobials**, where sensitivity would have otherwise been expected. The emergence of MDR pathogens has increased patient morbidity, treatment failure rates, healthcare-related costs, and imposed a greater burden on the environment.

Antimicrobial Stewardship

Antimicrobial stewardship is one component of a multifaceted approach to preventing the emergence and spread of resistant bacteria. The very essence is simple: **prescribe antimicrobials only when necessary and appropriately selected**, preserving their efficacy for both humans and animals. “Necessary” means there is a reasonable expectation that then treatment will result in clinical improvement. “Appropriate” refers to the selection of a specific drug, dose, route, and duration believed to be effective while minimizing potential adverse affects.

Several professional organizations, both human and veterinary, have published guidelines on how to properly use antimicrobials to prevent the emergence and spread of antimicrobial resistance (Table 1). However, because of the abundance of information provided, it may become difficult to see the big picture. Therefore, the present brochure has been produced to summarize and simplify, in sequential steps, the information currently available on antimicrobial stewardship in small animal medicine.

Guidelines for Prudent Antimicrobial Use in Companion Animals

The following guidelines are summarized in **Figure 1**. The bold numbers (e.g. **1**) cited within the text refer to numbered steps in **Figure 1**.

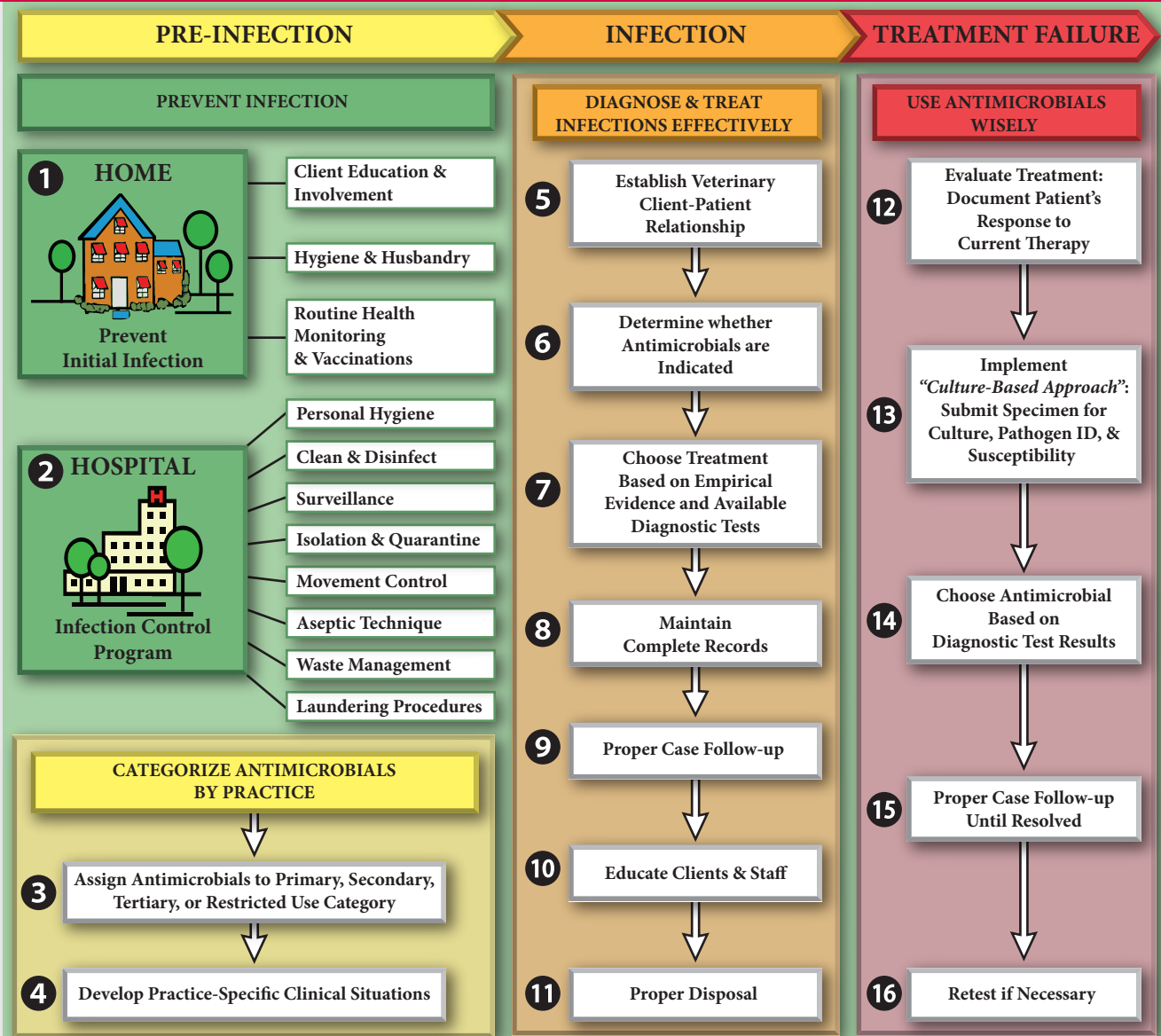


Figure 1. Steps to Properly Use Antibiotics in a Companion Animal Veterinary Practice

Pre-Infection

A. Prevent Infection:

The best way to reduce antibiotic use is to practice **prevention**, both at the household and the hospital level. **1** Through **client education** and routine involvement in new pet exams and patient visits, clients should have a broad understanding of good animal husbandry, hygiene, routine health monitoring, and disease prevention, so that animal health may be maintained at the household level.

Because nosocomial pathogens tend to be multidrug resistant, prevention of infectious diseases at the hospital level is also crucial. **2** Every veterinary hospital, regardless of size and type, should have a formal documented **infection control program**. This written plan should include and outline practices relating to personal hygiene (hand washing, work attire, PPE), cleaning and disinfection, surveillance, isolation and quarantine, movement within the hospital, aseptic technique, contaminated waste management, and proper laundering procedures

The National Association of State Public Health Veterinarians (NASPHV) has published a Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel and a model infection control plan for veterinary practices (nasphv.org). It is important to remember that routine prophylactic antibiotic use should never be used in place of good infection control practices.

B. Categorize Antimicrobials by Practice:

Based on guidelines recommended by the American College of Veterinary Internal Medicine (ACVIM) (Table 2), **3** each practice should **categorize antimicrobials** into four categories of use: Primary, Secondary, Tertiary, and Restricted. **4** Each practice should also **develop a list of "Practice-Specific Clinical Situations,"** the most common treatable conditions in which antimicrobials might be selected *empirically*, based on history, physical exam, available diagnostics, pharmacological properties, scientific evidence, and experience. In this way, antimicrobial use standards are established for common clinical situations.

Infection

A. Diagnose and Treat Infection Effectively:

Before prescribing any treatment, **5** a **valid veterinarian-client-patient relationship (VCPR)**, as defined by the AVMA, must be established, and **6** there should be sufficient evidence or a strong suspicion of a bacterial infection. Antimicrobials should not be used as a secondary treatment for non-bacterial etiologies; other therapeutic alternatives such as supportive care should be explored. **7** Choose the antibiotic with reference to the guidelines previously established for your practice.

It is important to **8 maintain complete patient records** in regards to treatment and outcome. **9** Also, **proper follow-up of each case**, verifying owner compliance and the patient's response to treatment, should be documented. **10** All clients should understand treatment protocol, such as dose, frequency, and treatment duration, for both the animal's health and for the prevention of antimicrobial resistance. Through annual CE training, staff should learn how to deliver such information to the client, in an educational manner.

Ideally, all antimicrobial doses will be administered; however, if they are not, **11** suggest that leftover doses be returned to the veterinary clinic or disposed of according to Food and Drug Administration (FDA) recommendations, such as discarding them in the household trash after mixing them with an unpalatable substance, e.g. coffee grounds, and sealing them in a container.