Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings

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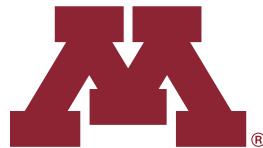
ANTIMICROBIAL RESISTANCE
AND STEWARDSHIP INITIATIVE

UNIVERSITY OF MINNESOTA
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Minnesota
ONE HEALTH
Antibiotic
Stewardship
Collaborative

WORKING TOGETHER TO
PROTECT HEALTH &
PRESERVE ANTIBIOTICS

MINNESOTA

Citation

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Antimicrobial Resistance and Stewardship Initiative

The Antimicrobial Resistance and Stewardship Initiative (ARSI) at the University of Minnesota connects clinicians with high-quality and evidence-based resources on the topics of antimicrobial resistance, antimicrobial stewardship, and infection prevention for veterinarians and animal owners. ARSI also conducts research to advance the practice of antimicrobial stewardship and understand the burden of antimicrobial use and resistance on companion animal health. Learn more at https://arsi.umn.edu.

Minnesota One Health Antibiotic Stewardship Collaborative

The Minnesota One Health Antibiotic Stewardship Collaborative (MOHASC) is comprised of over 100 professionals in human, animal, and environment health, from over 40 agencies, institutions, and organizations. Endorsed and supported by Minnesota Department of Health, Minnesota Department of Agriculture, Minnesota Pollution Control Agency, and Minnesota Board of Animal Health since 2016, MOHASC conducts activities within a work group structure to meet the goals of the *Minnesota One Health Antibiotic Stewardship Five-Year Strategic Plan*: to communicate the importance of antibiotic stewardship as a One Health issue to professionals and the public, advance stewardship in human healthcare, advance stewardship in animal health, and define our "antibiotic footprint" on Minnesota's natural environment. Volunteer members contribute over 2,000 aggregate hours to MOHASC activities each year, including time spent engaging with members of the public on antibiotic use and resistance topics. Everyone is welcome to sign up for the MOHASC electronic newsletter to receive updates and resources related to antibiotic stewardship. Learn more at https://www.health.state.mn.us/onehealthabx.

Prepared by:

Amanda Beaudoin DVM, PhD, DACVPM
Minnesota Department of Health and Department of Veterinary and Biomedical Sciences, College of Veterinary Medicine, University of Minnesota

Jennifer Granick DVM, PhD, DACVIM
Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of Minnesota

Emma Leof MPH
Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of Minnesota

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Executive Summary

Increased urgency to address the global problem of antimicrobial resistance (AMR) has necessitated systematic changes in the way that antimicrobials are used. Over the last two decades, antimicrobial stewardship (AS) programs have been implemented in human healthcare settings, including hospitals, nursing homes, outpatient clinics, and dentistry. Regulatory and practice changes have also influenced how antibiotics are used and prescribed in animal agriculture settings. The American Veterinary Medical Association (AVMA) projects that inappropriate antimicrobial use in companion animal veterinary medicine is likely as common as in human healthcare settings. Many of the antimicrobials prescribed, behavioral and clinical factors driving inappropriate use, and logistics of clinical care are also similar between healthcare and clinic-based veterinary practice. Both veterinary and healthcare experience led AVMA to establish five core principles of veterinary AS. Because the veterinary profession is diverse, these core principles must be made actionable for individual veterinary settings. This Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings outlines approaches that veterinary professionals can take to implement the core principles of AS. The Handbook is organized to help you identify feasible actions for your facility, given the realities of your practice scope, staff, and resources. No one person or veterinary hospital can put all AS initiatives into place at once. With this guide, veterinary professionals will make stepwise progress toward understanding how antibiotics are prescribed in their facility, identifying opportunities for improvement, and taking action to influence and measure change.

Introduction

Antibiotics are a powerful tool for fighting and preventing infections. However, widespread use of antibiotics has resulted in an alarming increase in antibiotic-resistant infections and a need to rely on broad-spectrum antibiotics that might be more toxic and expensive than those usually used for treatment. Since antibiotics are often unnecessarily or inappropriately prescribed, a concerted effort to decrease or eliminate inappropriate use can have a big impact on patient safety and the problem of AMR.

AS is defined by AVMA as "the actions veterinarians take individually and as a profession to preserve the effectiveness and availability of antimicrobial drugs through conscientious oversight and responsible medical decision-making while safeguarding animal, public, and environmental health." [1] Veterinarians play a critical role in combating AMR, promoting responsible antimicrobial use (AU), and reducing the impact of resistant pathogens.

AS requires commitment, leadership, communication, and directed action informed by best-practice guidelines and supported by clinical protocols and workflow solutions. This guide is meant to provide companion animal veterinary professionals with interventions, resources, and strategies to implement AS programs that incorporate these components into their unique clinic setting. It was developed by veterinarians at the University of Minnesota (UMN) Antimicrobial Resistance and Stewardship Initiative (ARSI) and the Minnesota Department of Health (MDH), with input from the Minnesota One Health Antibiotic Stewardship Collaborative and AS partners in the U.S. and beyond.

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[1] *AVMA Antimicrobial Stewardship Definition and Core Principles.*
https://www.avma.org/KB/Policies/Pages/Antimicrobial-Stewardship-Definition-and-Core-Principles.aspx

How to Use this Handbook

This Handbook is intended for use by veterinary practices interested in implementing the AVMA's core principles of AS in veterinary medicine.[1] These core principles are based on the Centers for Disease Control and Prevention (CDC) core elements of AS programs, which have been used successfully to improve AU in healthcare settings.[2] This guide provides a collection of concrete implementation strategies, suggestions, and tools to implement the core principles and is intended to be complementary to literature reviews and other evidence-based tools and resources. Implementation strategies are grouped by capacity and resource level: basic, intermediate, and advanced. This will help clinics identify feasible actions to take at present and ways to enhance their AS practices over time.

Although this Handbook largely uses the term "antibiotic," all antimicrobials should be used judiciously. Consider how you might implement these concepts for antifungal, antiparasitic, and antiviral prescribing.

The core principles of AS include:

- **commit to stewardship**

- **advocate for a system of care to prevent common diseases**

- **select and use antimicrobial drugs judiciously**

- **evaluate antimicrobial drug use practices**

- **educate and build expertise**

General Approach to Antimicrobial Stewardship Implementation

Veterinary clinics face several challenges to implementation of the robust AS programs that have become standard in many healthcare settings. There are few clinical AU guidelines, often insufficient diagnostic testing information [e.g., bacterial culture and susceptibility (C&S)], lack of access to AU and AMR data, and often limited human and financial resources to carry out the work. Few training programs exist that focus on AS, pharmacology, data management, or quality improvement in the veterinary setting. **Although a clinic might not be able to implement all recommended aspects of an AS program, it is possible for all clinics to make stepwise progress.** Such an approach can help you build the foundation of AS knowledge, awareness, and accountability that will help your program to grow over time (Figure 1).

Figure 1: *Stepwise approach to implementing an AS program in a veterinary clinic*

5. **Implement actions and assess impact**

4. **Educate staff on AMR and AS. Convey importance, methods, and assessment of clinic intervention(s)**

3. **Define protocols or guidelines for priority area(s)**

2. **Identify one or a small number of priority areas**

1. **Form ASC and identify Champion**

[2] *CDC Core Elements of Antibiotic Stewardship. https://www.cdc.gov/antibiotic-use/core-elements/*

For clinics of all sizes and abilities, the first step is to form an AS committee (ASC) and identify a single AS Champion. The ASC should include clinic leadership, prescriber(s), technicians(s), clinic manager, as well as any staff with infectious disease/pharmacology training or in-depth knowledge of the clinic's practice management software. The ASC will set initial AS priorities, identify or define protocols to support those priorities, and establish a plan for educating all staff on AMR, AS, and clinic interventions. The ASC should meet regularly to assess priority interventions and evaluate progress of the AS program. Where possible, veterinary AS leaders should align the AS program with other initiatives, like promotion of preventive care and infection prevention and control.

To help clinics identify what AS activities are feasible given current resources, Table 1 categorizes activities as basic, intermediate, and advanced. Basic activities require only commitment, personnel time, and some access to technical expertise (e.g., in-person communication, use of published AS resources). Intermediate activities require some resources, planning, and dedicated staff. Advanced activities require an established AS program with trained staff and dedicated resources.

Table 1: *Categorization of AS activities by clinic resource availability*

Basic
Requires commitment, personnel time, some access to technical expertise

- Form an ASC and define role for group and each member
- Communicate and display AS commitment to clients
- Formalize use of published prescribing guidelines in clinic (e.g., urinary tract and respiratory disease, canine pyoderma)
- Educate veterinary staff about AMR and AS, clinic protocols, guidelines (e.g., annually and at new hire)
- Emphasize patient wellness and infection prevention

Intermediate
Requires some resources, planning, dedicated staff

- Generate snapshot of AU through point prevalence survey or other data collection approach
- Create treatment protocols for diseases without published guidelines, considering local susceptibility, expert opinion, or guidelines from other countries
- Implement antibiotic time-out approach for hospitalized patients
- Use prior-authorization for third-line antibiotics

Advanced
Requires an established AS program with trained staff and dedicated resources

- Conduct routine AU tracking
- Measure antibiotic appropriateness for priority syndromes
- Provide rates of overall AU and appropriateness to staff and, if possible, give individual AU feedback to prescribers
- Establish system to enforce protocol use
- Track outcomes of AU (e.g., infection resolution, adverse drug reactions, development of resistant infection)
- Conduct monitoring and evaluation of AS program

This Handbook provides specific examples of AS actions that can help veterinary clinics practice the AVMA core principles of AS. Use the stepwise framework described above to help determine which of the examples you might be able to implement in your clinic. Try to put into practice activities that pertain to each of the five core principles.

Basic Antimicrobial Stewardship Interventions

Interventions in the basic level are the first AS interventions that clinics should tackle. Completing these interventions will position a clinic for success in intermediate and advanced level interventions.

Core Principle 1: Commit to stewardship

Form your AS Committee.

Implementation Strategies

a. **Identify stakeholders for the ASC.** Key representation includes clinic leadership, at least one practicing veterinarian, at least one veterinary technician, and the clinic manager.
   i. If there is a staff member with specific training, or a strong interest, in infectious diseases or pharmacology, be sure to include him or her in the ASC.
   ii. Also consider including the staff member that has the best understanding of the clinic's practice management software or system for keeping medical records, even if this person does not do clinical work. The ASC will need access to data on AU and diagnoses from the software system or paper records. This person can also use the software to incorporate AS actions into clinical workflow and AS messaging into client print-outs.
   iii. If part of a clinic group, consider including a corporate representative who can share perspectives and experiences of other clinics and, perhaps, provide leadership or financial support for AS initiatives.
b. **Meet regularly (e.g., once monthly) as the ASC** to assess priority interventions and evaluate progress of the AS program.
c. **Educate all staff** on the problem of AMR and the concept of AS.

Resources

> ARSI: Sample Letter to Staff: Communicate Antibiotic Stewardship Priorities. https://arsi.umn.edu/cliniccommitment
> MDH: Fact Sheet: Antibiotic Use in Companion Animal Veterinary Practice (PDF).
> https://www.health.state.mn.us/diseases/antibioticresistance/animal/animalcafs.pdf
> ARSI: AMR and AS Background Information, Fact Sheets, and Research Highlights. https://arsi.umn.edu/as-general

Identify an AS Champion.

Implementation Strategies

a. **Identify a single veterinarian to be the AS Champion.** This veterinarian will lead the work of the ASC and be the AS point-of-contact for staff, clients, other clinics, and, where relevant, corporate leadership. The AS Champion is not responsible for all patients on antimicrobials; individual clinicians maintain primary client communication and primary case responsibility for their patients. The AS Champion could fulfill the role of primary contact with the reference microbiology laboratory the clinic uses.
b. **Draft a written statement that identifies the AS Champion** for clinic staff and explains the AS Champion's role.
c. **Display a commitment poster**, to be seen by clients and staff, that identifies the AS Champion and states the clinic's commitment to AS.

Resources

> ARSI: Veterinary Antimicrobial Stewardship Roles and Responsibilities: Use this guidance document to define contributions of the AS Champion and all other staff. https://arsi.umn.edu/asroles
> ARSI: Sample Email Introducing our Clinic's Antimicrobial Stewardship Champion: Sample email to introduce the antimicrobial stewardship leader to clinic staff. https://arsi.umn.edu/championannouncement
> ARSI: Customizable AS Champion Commitment Poster: Download the Microsoft PowerPoint template and add your own images and logos. https://arsi.umn.edu/championpostertemplate

Make a public commitment to your clients.

Implementation Strategies

a. **Send a letter or email** to clients about your clinic's commitment to AS policies.

b. **Use talking points** to discuss appropriate AU with clients.

c. **Publically display your clinic's commitment to AS** in examination and waiting rooms (Figure 2). In human healthcare settings, exam room commitment posters with a clinician's photo have been linked to improved AU.[3] Such posters hold the facility and prescribers accountable, inform patients about the importance of using antibiotics only when needed, and provide a stimulus for conversations about AU.

d. **Include a clinic AS commitment statement** in bylines of emails and in documents sent home with clients. Or, incorporate the "O.W.N." logo ("Only When Needed") designed for pet health (Figure 3). This logo is a concise and attractive way to raise client awareness. It can be used in email footers, visit statements, and commitment posters.

e. **Put up a special poster for U.S. Antibiotic Awareness Week (USAAW),** which occurs annually in November. This annual event is meant to raise awareness about responsible AU.

Resources

ARSI: Sample Commitment Letter to Clients: Demonstrate your commitment to AS by sending this customizable letter to clients. https://arsi.umn.edu/commitmenttoclients

ARSI: Veterinary Antimicrobial Use Talking Points: Examples of effective engagement strategies, contingency plans, and positive care recommendations to support clinician-client communication. https://arsi.umn.edu/talkingpoints

MDH: Customizable Commitment Posters: Download the Microsoft PowerPoint templates and add your own images and logos. Or, use one of the ready-made posters. https://www.health.state.mn.us/diseases/antibioticresistance/animal/index.html#commit

MDH: Electronic image files of "Only When Needed, O.W.N." antibiotic awareness logo: Download these files and use them freely in your own materials and messaging. https://www.health.state.mn.us/diseases/antibioticresistance/own/index.html

CDC: USAAW Toolkit: Learn more about this annual event, and download electronic images. https://www.cdc.gov/antibiotic-use/week/toolkit.html

AVMA: Clinic Posters: Be Careful with Antibiotics. https://www.avma.org/PracticeManagement/ClientMaterials/Pages/clinic-posters-be-careful-antibiotics.aspx

Figure 2: Sample AS commitment posters

[3] *Meeker et al. Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial. JAMA Intern Med. 2014 March; 174(3):425–431.*

Define (and redefine) your hospital AS priorities.

Implementation Strategies
a. **Set AS priorities for initial intervention,** and revise these as progress is made. Start simply and build your priority list over time. Consider:
   i. Increase awareness, and encourage use, of International Society for Companion Animal Infectious Diseases (ISCAID) guidelines.
   ii. Improvement in client-staff communication on AU.
b. **Identify protocols**, existing or clinic-defined, to support those priorities.
c. **Educate staff on AS priorities and protocols.**
   i. For clinical staff, provide specific training on how AS actions should be incorporated into workflow and documented in patient records.
   ii. Have staff sign each protocol after education and training.
   iii. Require new staff to receive training on clinic AS policy, priorities, and protocols.
   iv. Renew training for staff on an annual basis, or as otherwise defined by the ASC.

Resources

> **ISCAID: Prescribing guidelines:** Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

Core Principle 2:

Advocate for a system of care to prevent common diseases

Educate clients on the importance of preventative care.

Implementation Strategies
a. **Promote the importance of annual wellness visits** for disease prevention and diagnosis and for overall pet health.
b. **Make clear the benefit of vaccination and preventive care.** Educate clients on the clinical impact of vaccine-preventable diseases, like distemper, parvovirus, kennel cough, influenza, leptospirosis, Lyme, feline leukemia virus (FeLV), and feline immunodeficiency virus (FIV).
   i. Consider sharing de-identified stories of pets seen in your clinic that have suffered from preventable conditions. You might do this as part of email updates or by posts on social media.
   ii. Share population-level surveillance data on preventable diseases, if available, from sources like Companion Animal Parasite Council.
c. **Empower your clients to keep their animals healthy** by feeding a nutritious diet, providing exercise, maintaining a healthy pet weight, and investing in preventive dental care.
d. In AS messaging, **inform owners that good preventive care can reduce the need for treatment** with antibiotic drugs. Some examples include Lyme disease and bacterial complications from vaccine-preventable viral respiratory infections.

Resources

> **AVMA: Pet Care website:** Use AVMA's content to educate owners on the importance of wellness exams, preventable diseases, and more. https://www.avma.org/public/petcare/pages/default.aspx
>
> **AVMA: Pet Dental Care website**. https://www.avma.org/public/PetCare/Pages/Pet-Dental-Care.aspx
>
> **American Animal Hospital Association (AAHA) Guidelines:** Find evidence-based information to guide care and communication about clinically relevant topics. https://www.aaha.org/aaha-guidelines/what-are-aaha-guidelines/
>
> **AAHA: 2019 AAHA Canine Life Stage Guidelines:** Find definitions, checklists, client talking points, and more in this comprehensive toolkit. https://www.aaha.org/aaha-guidelines/life-stage-canine-2019/life-stage-canine-2019/
>
> **AAHA: 2010 AAHA Feline Life Stage Guidelines:** Find wellness visit how-to, communication for overcoming barriers to clinic visits, and more in this comprehensive toolkit. https://www.aaha.org/aaha-guidelines/life-stage-feline-configuration/background-and-goals/
>
> **Companion Animal Parasite Council:** This website has maps that show the prevalence of parasitic diseases that can be prevented: https://capcvet.org/
>
> **Banfield Pet Hospital: State of Pet Health**. https://www.banfield.com/state-of-pet-health
>
> **MDH: Fact Sheet: Antibiotics and Your Pets: What You Should Know.**

Prevent healthcare-associated infections in your hospital.

Implementation Strategy

Review your clinic infection prevention and control (IPC) plan with staff. Infections that occur within healthcare settings, including veterinary clinics, might be more likely to be resistant to antibiotics. Not only is IPC an expectation for patient care, but it also plays a major role in preventing AU and resistant infections.

Resources

ARSI: List of Infection Prevention and Control Resources. https://arsi.umn.edu/ipc-resources

AAHA: 2018 Infection Prevention, Control, and Biosecurity Recommendations. https://www.aaha.org/aaha-guidelines/infection-control-configuration/aaha-infection-control-prevention-and-biosecurity-guidelines/

Canadian Committee on Antibiotic Resistance Infection Prevention and Control: Best Practices for Small Animal Veterinary Clinics. https://oahn.ca/wp-content/uploads/2020/01/OAHN-IPC-Guide-SB-Final-Jan0820_All_tagged-SUR.pdf

Core Principle 3:
Select and use antimicrobial drugs judiciously

Provide clinical guidance for responsible antimicrobial use.

Implementation Strategies

a. **Share broad concepts of responsible AU** with veterinarians and staff. Consider posting these in your clinic. For example:
   i. Make a diagnosis.
   ii. Follow antimicrobial guidelines.
   iii. Consider host, likely disease agent, and drug when selecting an antimicrobial.
   iv. Use the correct dose and duration.
   v. Document indication, drug, dose, frequency, route, and duration.
   vi. Incorporate watchful waiting, as appropriate.
   vii. Regularly review the need for therapy.
   viii. Teach clients to administer antimicrobials.
   ix. Do not prescribe antimicrobials "just in case."
   x. Use a tiered approach, choosing antimicrobials with lower importance to human medicine first.

b. **Utilize ISCAID guidelines** for treating canine pyoderma and canine and feline urinary and respiratory tract infections.
   i. Provide all veterinarians with the ISCAID publications and conduct an active review and discussion of the guidelines at an in-person meeting (e.g., quarterly AS meeting).
   ii. Review current practices. Discuss any concerns that veterinarians in your clinic have with following the ISCAID guidelines, and, in particular, recommendations for first-line drug choice.
   iii. Come to agreement on the first-line drugs that veterinarians in your clinic will be encouraged to prescribe for these conditions.
   iv. Post a summary (e.g., ARSI pocket guide) of AU guidelines for these syndromes in the pharmacy area and/or near computers where patient notes and treatment plans are recorded.

c. **Develop protocols to guide AU after procedures**, including surgeries. Antibiotics are not a substitute for careful sterile technique and infection prevention practices. Clean surgical wounds do not require ongoing antimicrobial treatment unless there is a break in sterile technique or a surgical implant has been placed. Clean-contaminated, contaminated, and dirty wounds should be cultured to determine appropriate treatment.
   i. Post your perioperative AU protocol in where it can be seen by veterinarians and surgical staff.
   ii. Consider developing a fact sheet for clients on AU prescribing before and after surgeries. Ensure that the handout is specific to your clinic's practice protocols.

d. **Encourage veterinarians to identify and use antibiotic alternatives** for management of ill patients, when appropriate. For example, consider dietary intervention instead of antimicrobials for acute diarrhea in dogs and cats.

Resources

Minnesota Veterinary Medical Association (MVMA): AS in Veterinary Medicine Webinar Series: Two webinars focus specifically on companion animal medicine. The webinar on equine AS also contains broad concepts that are relevant for small animal practice. https://www.mvma.org/antibiotic-stewardship-in-veterinary-medicine

AVMA: Antimicrobial Therapy Do's and Don'ts for Felines.
https://www.avma.org/sites/default/files/resources/AntibioticDoDonts_CAT.pdf

AVMA: Antimicrobial Therapy Do's and Don'ts for Canines.
https://www.avma.org/sites/default/files/resources/AntibioticDoDonts_DOGpdf.pdf

ISCAID: Prescribing guidelines: Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection.
Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

ARSI: Pocket Guide: Antimicrobial Prescribing for Common Small Animal Diseases. https://arsi.umn.edu/pocketguide

Tufts Foster Hospital for Small Animals: Use of Antibiotics in Dogs and Cats Having Surgery: This handout provides an example of how you can communicate your clinic's protocols with clients. https://vetmed.tufts.edu/wp-content/uploads/FHSA-AntibioticsUse.pdf

AVMA: Extralabel Drug Use (ELDU) Algorithm: Understand the conditions under which a veterinarian can practice extralabel use of approved animal and human drugs and the responsibilities that accompany this privilege.
https://www.avma.org/KB/Resources/Reference/Pages/AVMA-Extralabel-Drug-Use-ELDU-Algorithm.aspx

Develop protocols for use of clinical diagnostics.

Implementation Strategy

a. **Ensure that your clinic uses best practices to collect specimens** intended for culture and identification.

b. **Establish and maintain collaboration and communication with the microbiology laboratory**, as they will be responsible for providing timely and accurate species identification and antimicrobial susceptibility testing.

Resources

British Small Animal Veterinary Association (BSAVA): Cytology and Culture. https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME/Cytology-and-culture

Cornell University Animal Health Diagnostic Center: Blood culture technique. https://www.vet.cornell.edu/animal-health-diagnostic-center/testing/protocols/blood-culture-technique

ISCAID: Prescribing guidelines: Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

Core Principle 4:
Evaluate antimicrobial drug use practices

Inventory antimicrobials in your facility.

Implementation Strategies

Develop a list (formulary) of antimicrobials kept in the facility to share with veterinary staff. Indicate which drugs are identified as first-line drugs for treatment of common conditions (e.g., by using the ISCAID guidelines) and those that should be reserved for second- or third-line use. Consider discussing the antimicrobial list and the ISCAID guidelines at a staff meeting. Do the veterinarians in your clinic reach for recommended first-line drugs first? Why or why not? Conversation is a good first step to understanding practice and perception without labor intensive data collection.

Resources

ISCAID: Prescribing guidelines: Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for first-line antibiotic choices. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

ARSI: Pocket Guide: Antimicrobial Prescribing for Common Small Animal Diseases. https://arsi.umn.edu/pocketguide

Core Principle 5: Educate and build expertise

Evaluate antimicrobial drug use practices.

Implementation Strategies
a. **Educate all staff on the problem of AMR and antibiotic misuse**, as well as on the role of companion animal medicine in AS. Consider using a pre-recorded webinar from MOHASC/MVMA for this session. Or, wrap your own content into an annual training session.
b. **Stay up-to-date on AMR and AS by subscribing to email bulletins**, like those from MOHASC and Center for Infectious Disease Research and Policy (CIDRAP).

Resources

MVMA: AS in Veterinary Medicine Webinar Series: Two webinars in this series focus on companion animal AS. The webinar on equine AS also contains broad concepts relevant for small animal practice.
https://www.mvma.org/antibiotic-stewardship-in-veterinary-medicine
UMN: Antimicrobial Resistance Learning Site. https://amrls.umn.edu/
AVMA: Core Principles of AS.
https://www.avma.org/KB/Policies/Pages/Antimicrobial-Stewardship-Definition-and-Core-Principles.aspx
MDH: Frequently Asked Questions (FAQ) about Antimicrobial Resistance and Stewardship.
https://www.health.state.mn.us/diseases/antibioticresistance/basics/faq.html
MOHASC website: Find resources and tools, information, and Minnesota objectives for stewardship across human and animal health. Subscribe to email bulletins by the link in the upper right-hand corner of the page. https://www.health.state.mn.us/onehealthabx
CIDRAP Antimicrobial Stewardship Project: Find up-to-date AS news and resources. http://www.cidrap.umn.edu/asp
ARSI: AMR and AS Background Information, Fact Sheets, and Research Highlights. https://arsi.umn.edu/as-general

Communicate with pet owners about AMR and other potential harms of AU.

Implementation Strategies
a. **Encourage use of talking points** and other materials to guide client communication about AU.
b. **Do not wait to talk about AMR and AS until patients are sick.** Discuss the importance of diagnostic testing, vaccination, and other preventive measures in preserving antibiotics for future use. Talk about your clinic's commitment posters and explain why they are there.
c. **Make resources available that describe appropriate AU in other veterinary settings**, like food animal production and equine medicine. As veterinarians, it is important to help clients and the public understand why AU is important for all species in our care.

Resources

ARSI: Veterinary Antimicrobial Use Talking Points: Examples of effective engagement strategies, contingency plans, and positive care recommendations to support clinician-client communication. https://arsi.umn.edu/talkingpoints
ARSI: Sample Client Handout: Non-Antibiotic Prescription Pad: This client handout affirms that the pet owner's concerns have been heard and that a diagnosis has been made but that no antibiotic is needed at the time. The form includes a space for the veterinarian to recommend approaches to symptom relief and directions for follow-up. https://arsi.umn.edu/noabx
MDH: Fact Sheet: Antibiotics and Your Pets: What You Should Know.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/abxpetfs.pdf
MDH: Fact Sheet: The Truth about Milk and Antibiotics.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/truthmilk.pdf
MDH: Fact Sheet: The Truth about Meat and Antibiotics.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/truthmeat.pdf
MDH: Fact Sheet: Antibiotic Use in Horses: Changing Expectations.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/horsefs.pdf
AVMA: Antimicrobial Use and Antimicrobial Resistance FAQ.
https://www.avma.org/KB/Resources/FAQs/Pages/Antimicrobial-Use-and-Antimicrobial-Resistance-FAQs.aspx
MDH: FAQ About Antimicrobial Use and Resistance. https://www.health.state.mn.us/diseases/antibioticresistance/basics/faq.html
Colorado State University: Communication Toolbox for Veterinary Professionals.
csu-cvmbs.colostate.edu/academics/clinsci/veterinary-communication/Pages/communication-toolbox-for-veterinary-professionals.aspx

Provide information to clients about safe medication disposal.

Implementation Strategy
Hang a poster with information about the closest prescription drug take-back location to your clinic. This might be a pharmacy or law enforcement agency.

Resources

National resource: Earth 911: How to Recycle Unwanted and Expired Medications: Find a U.S. location to bring unwanted drugs for proper disposal. https://earth911.com/recycling-guide/how-to-recycle-unwanted-or-expired-medications/

Minnesota Pollution Control Agency (MPCA): Managing Unwanted Medications: Learn about how to properly disposal of unwanted household medications and find a Minnesota take-back location.
https://www.pca.state.mn.us/living-green/managing-unwanted-medications

AVMA: Prescription for Safety: How to Dispose of Unwanted Medicine: A great handout for clients.
https://ebusiness.avma.org/files/productdownloads/Disposing_unwanted_meds.pdf

MDH: Fact Sheet: Antibiotics and the Environment: What You Should Know.
https://www.health.state.mn.us/diseases/antibioticresistance/environment/environmentfs.pdf

Checklist for Core Principle Implementation - *Basic*

Core Principle 1: Commit to stewardship	Target date	✔
Form an ASC. Identify members, meet regularly, and educate staff.		
Identify an AS Champion. Draft a written statement and have a poster identifying the Champion.		
Make a public commitment to clients. Send letters or email, use talking points, display commitment posters, write a commitment statement, and celebrate USAAW.		
Define hospital AS priorities. Find priorities for initial action, identify protocols to support priorities, educate staff on these issues.		

Core Principle 2: Prevent common diseases	Target date	✔
Educate clients on preventative care. Promote wellness care and vaccination, empower owners to keep pets healthy.		
Prevent healthcare-associated infections. Review your infection prevention plan with staff.		

Core Principle 3: Select and use antimicrobial drugs judiciously	Target date	✔
Provide clinical guidance for responsible AU. Share broad concepts of responsible AU, use ISCAID guidelines, develop protocols for surgical AU, and identify antibiotic alternatives.		
Develop protocols for use of clinical diagnostics. Ensure best practices for specimen collection.		

Core Principle 4: Evaluate antimicrobial use practices	Target date	✔
Inventory antimicrobials in your facility. Develop a list (formulary) of antimicrobials, indicate which are considered first-line for common conditions, and discuss among veterinarians.		

Core Principle 5: Educate and build expertise	Target date	✔
Require staff training. Educate on problem of AMR and antibiotic misuse, and stay up-to-date with email bulletin subscriptions.		
Communicate with pet owners. Use veterinary AU talking points, non-antibiotic prescription pad, and fact sheets.		
Provide information about safe medication disposal. Hang a poster with information about local take back locations.		

Intermediate Antimicrobial Stewardship Interventions

In general, intermediate AS interventions should build upon an AS program that incorporates basic level interventions, but AS leaders should feel free to implement any actions that are feasible, acceptable, sustainable, and will make an impact in their facilities.

Core Principle 1: Commit to stewardship

Draft an AS policy.

Implementation Strategies

a. **Draft a policy document** that outlines the concepts that will guide expectations of staff members, communication with clients, and specific AS interventions. Consider AVMA Antimicrobial Stewardship Core Principles and Judicious Use guidance in drafting the policy.

b. **Define AS activities and responsibilities in position descriptions** of all relevant staff, including requirements for annual or other AS training.

c. **Educate all staff** on the clinic policy. Include background on the behavioral and social aspects of prescribing, including the concept of "clinic norms," client pressure (real or perceived), time constraints, and diagnostic uncertainty.

d. **Set up a regular (e.g., quarterly) AS update meeting with all staff** for the purposes of training on new or changing protocols and expectations, and sharing feedback on AS program progress, successes, and opportunities for improvement.

Resources

> **ARSI: Veterinary Antimicrobial Stewardship Roles and Responsibilities:** Use this guidance document to define contributions of the ASC and all other staff. https://arsi.umn.edu/asroles
>
> **American Association of Feline Practitioners/AAHA: Basic Guidelines of Judicious Therapeutic Use of Antimicrobials.**
> https://www.avma.org/KB/Policies/Pages/AAFP-AAHA-Basic-Guidelines-of-Judicious-Therapeutic-Use-of-Antimicrobials.aspx
>
> **AVMA: Core Principles of AS.**
> https://www.avma.org/KB/Policies/Pages/Antimicrobial-Stewardship-Definition-and-Core-Principles.aspx
>
> **Pew Charitable Trusts: What Drives Inappropriate Antibiotic Use in Outpatient Care?**
> https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/06/what-drives-inappropriate-antibiotic-use-in-outpatient-care

Formalize the AS Champion Role.

Implementation Strategy

Include the AS Champion's role in their job description, and formally dedicate time to the Champion's AS duties (e.g., hours per month). This will ensure that, as more actions are put into place, the AS program does not fall victim to competing demands of busy veterinary practice.

Resources

> **ARSI: Veterinary Antimicrobial Stewardship Roles and Responsibilities:** Use this guidance document to define contributions of the ASC and all other staff. https://arsi.umn.edu/asroles

Actively promote responsible AU to your clients and the public.

Implementation Strategy

Celebrate USAAW, which occurs annually in November. This annual event is meant to raise awareness about responsible AU. Take advantage of wider community messaging during this week to amplify your message. Consider sending emails or posting on social media to highlight USAAW. Take this opportunity to do special education for staff. Download a graphic element from the MDH Only When Needed theme that highlights the importance of responsible AU for pet health (Figure 3).

Resources

> **CDC: USAAW Toolkit:** Learn more about this annual event, and download electronic images.
> https://www.cdc.gov/antibiotic-use/week/toolkit.html
> **MDH: Antibiotics Only When Needed (O.W.N.).** https://www.health.state.mn.us/diseases/antibioticresistance/own/index.html

Figure 3: Antibiotics Only When Needed (O.W.N.) theme for pet health partnersclinics

Define (and redefine) your hospital AS priorities.

Implementation Strategies

a. **Identify gaps in practice** that, if addressed, would lead to improved antibiotic prescribing. Assessment of gaps should include client, communication, diagnostic, therapeutic, formulary, and workflow factors that influence AU or selection.

b. **Set AS priorities for initial intervention**, and revise these as progress is made. Start simply and build your priority list over time. Consider:
   i. Conditions (e.g., acute diarrhea) to target for improved prescribing in addition to those covered by ISCAID guidelines.
   ii. Antibiotic drugs (e.g., fluoroquinolones, 3rd generation cephalosporins) to target for reduction in empiric prescribing.
   iii. Optimal diagnostic testing approach for specific disease syndromes.

c. **Identify protocols, existing or clinic-defined, to support those priorities.**

d. **Educate staff on AS priorities and protocols.**
   i. For clinical staff, provide specific training on how AS actions should be incorporated into workflow and documented in patient records.
   ii. Have staff sign each protocol after education and training.
   iii. Require new staff to receive training on clinic AS policy, priorities, and protocols.
   iv. Renew training for staff on an annual basis, or as otherwise defined by the ASC.

Resources

> **ISCAID: Prescribing guidelines:** Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources
> **BSAVA: PROTECT ME poster to support guideline-setting**.
> https://www.bsavalibrary.com/content/chapter/10.22233/9781910443644.chap6_1#supplementary_data

Core Principle 2:

Advocate for a system of care to prevent common diseases

Develop prevention protocols for high-priority conditions.

Implementation Strategies

a. **Identify high-priority conditions**, the prevention of which would result in reduced AU (e.g., Lyme disease). Consider not only bacterial infections, but also viral infections, which can lead to secondary bacterial infection or that might be inappropriately treated with antibiotics (e.g., feline upper respiratory infections).

b. **Develop protocols for use in your hospital that incorporate prevention measures, early diagnosis, and approaches for client communication.**
   i. As you are starting out, consider aligning these conditions with your clinic AS priorities. For example, if you have prioritized diagnosis and management of canine infectious respiratory disease as an AS priority, you can incorporate client education for at-risk pets.
   ii. Base prevention protocols on published guidelines and professional consensus statements.

c. **Educate staff on prevention priorities** and encourage them to communicate disease prevention priorities with clients.

Core Principle 3: Select and use antimicrobial drugs judiciously
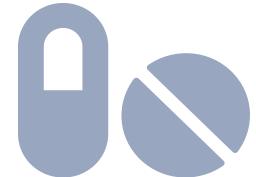
Provide clinical guidance for responsible AU.

Implementation Strategies

a. **Task the ASC with defining additional prescribing guidelines.** Focus on your priority conditions (e.g., acute diarrhea) for which antibiotics are often inappropriately prescribed.
   i. Consider local susceptibility patterns and, if needed, consult with a veterinary infectious disease or pharmacy expert at a teaching hospital or referral clinic.
   ii. Bring all veterinarians together for an active review and discussion of the guidelines (e.g., at quarterly AS meeting).
   iii. Come to agreement on the first-line drugs for these conditions.
   iv. Include these guidelines in the AU guideline poster. BSAVA has a nice example poster.

b. **Define appropriate use of prophylactic antibiotics**, including drug selection and treatment duration.
   i. Review current practices.
   ii. Identify situations in which prophylactic use is appropriate, as well as situations in which it is not appropriate. Define specific indications, recommended drug selection, dose, and duration.
   iii. Include prophylactic AU guidelines in the AU guideline poster.

c. **Create an environment that supports veterinarians when antibiotics are not needed.**
   i. Use the non-antibiotic prescription pad ("Your Pet Does Not Need an Antibiotic Today") handout to support affirmative and positive client communication when an ill pet will leave without antibiotic treatment.
   ii. Communicate the importance of protocol adherence by all veterinarians, so that clients experience consistent service and clinic-wide responsible AU.
   iii. Make the AS statement and prescribing protocols available to relief veterinarians.

Resources

BSAVA: PROTECT ME poster to support guideline-setting.
https://www.bsavalibrary.com/content/chapter/10.22233/9781910443644.chap6_1#supplementary_data
ARSI: How to Use a Clinical Antibiogram: Interpretation of antibiograms is not always as easy as it seems. Use this guide to ensure that you are using this important tool correctly. https://arsi.umn.edu/antibiogramhowto
ARSI: Sample Client Handout: Non-Antibiotic Prescription Pad: This client handout affirms that the pet owner's concerns have been heard and that a diagnosis has been made but that no antibiotic is needed at the time. The form includes a space for the veterinarian to recommend approaches to symptom relief and directions for follow-up. https://arsi.umn.edu/noabx
Kansas Department of Health and Environment (KDHE): Feline Upper Respiratory Virus and Feline Viral Cystitis Viral Prescription Pads: Two client handouts that provide tips for pet owners to help their pets feel better when an antibiotic is not needed. https://public.kfmc.org/sites/hai/SitePages/Resources.aspx

Implement AS actions to prevent inappropriate prescribing.

Implementation Strategies
a. **Incorporate watchful waiting into your clinic's outpatient practices.** Watchful waiting can be used for patients with conditions that often resolve without treatment but who can benefit from antibiotics if the condition does not improve. Make sure to communicate the plan for watchful waiting and identify when the pet owner should be concerned or contact the clinic to follow-up. Watchful waiting opportunities include feline upper respiratory tract infection and acute diarrhea in dogs and cats.
b. **Routinely conduct antibiotic time-outs for hospitalized patients.** The time-out provides an opportunity for the veterinarian and technician(s) caring for the patient to review the need for antibiotic therapy. If antibiotic therapy is still warranted, the team should consider whether a change in drug selection (i.e., narrow-spectrum to more specifically target the infecting organism), dose, or duration is warranted. Conducting the time-out after 48 hours allows time to assess the patient's response to therapy (or lack thereof) and for return of diagnostic testing results, including from C&S, but timing can be adjusted based on individual clinic needs.

Resources

ARSI: Sample Client Handout: Non-Antibiotic Prescription Pad: This client handout affirms that the pet owner's concerns have been heard and that a diagnosis has been made but that no antibiotic is needed at the time. The form includes a space for the veterinarian to recommend approaches to symptom relief and directions for follow-up. https://arsi.umn.edu/noabx
KDHE: Feline Upper Respiratory Virus and Feline Viral Cystitis Viral Prescription Pads: Two client handouts that provide tips for pet owners to help their pets feel better when an antibiotic is not needed. https://public.kfmc.org/sites/hai/SitePages/Resources.aspx
ARSI: Antimicrobial Time-Out Form Template: Customize this document to incorporate your clinic's antibiotic time-out policy. https://arsi.umn.edu/antibiotictimeout
ARSI: Veterinary Antimicrobial Use Talking Points: Examples of effective engagement strategies, contingency plans, and positive care recommendations to support clinician-client communication. https://arsi.umn.edu/talkingpoints
MDH: Fact Sheet: Antibiotics and Your Pets: What You Should Know.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/abxpetfs.pdf

Review hospital antimicrobials, and identify opportunities for formulary-level AS action.

Implementation Strategies
Set clear criteria for use of third-line antimicrobials (e.g., carbapenems, linezolid, vancomycin). For example, follow the example set by ISCAID:[4]
   i. Infection must be documented based on clinical, culture, or cytological abnormalities. Use for treatment of subclinical infection is not supported.
   ii. Resistance to all other reasonable options, and susceptibility to the chosen antimicrobial, must be documented.
   iii. Infection must be potentially treatable. Use of critical drugs in situations with little realistic chance of infection elimination (e.g., failure to remove underlying cause) is not supported.
   iv. Consultation with an expert in infectious diseases and antimicrobial therapy must be obtained to determine whether other viable options exist and whether treatment is reasonable.

Resources

AVMA: Guideline for Veterinary Prescription Drugs.
https://www.avma.org/KB/Policies/Pages/Guidelines-for-Veterinary-Prescription-Drugs.aspx
AVMA: ELDU Algorithm: Understand the conditions under which a veterinarian can practice extralabel use of approved animal and human drugs and the responsibilities that accompany this privilege.
https://www.avma.org/KB/Resources/Reference/Pages/AVMA-Extralabel-Drug-Use-ELDU-Algorithm.aspx
World Health Organization (WHO): List of Critically Important Antimicrobials: International list of critically important antimicrobials for human medicine. https://www.who.int/foodsafety/areas_work/antimicrobial-resistance/cia/en/

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[4] *Weese S. et al. Antimicrobial use guidelines for treatment of urinary tract disease in dogs and cats: antimicrobial guidelines working group of the international society for companion animal infectious diseases. Vet Med Intl 2011; 2011:263768*

Develop protocols for use of clinical diagnostics.

Implementation Strategies

a. **Utilize all available diagnostics, not just C&S testing.**
   i. Incorporate practices like in-house cytology, Gram staining, and bronchoalveolar lavage into clinic protocols to help interpret C&S test results.
   ii. Use diagnostic testing to help rule out viral, fungal, and parasite infections, as well as other conditions, such as neoplasia and immune-mediated conditions.

b. **Draft protocols for ordering C&S to support their consistent, meaningful use.** In addition to guidance specific to your AS priority conditions, consider incorporating more general recommendations to culture when:
   i. Making the wrong antimicrobial choice could be life-threatening.
   ii. Patient has an unusual presentation.
   iii. Patient does not respond to recommended first-line therapy.
   iv. Infection is likely to involve multidrug-resistant pathogen(s).
   v. Patient might be difficult to see for follow-up.
   vi. Patient has a history of recent AU.

Resources

BSAVA: Cytology and Culture. https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME/Cytology-and-culture
Cornell University Animal Health Diagnostic Center: Blood culture technique.
https://www.vet.cornell.edu/animal-health-diagnostic-center/testing/protocols/blood-culture-technique
ISCAID: Prescribing guidelines: Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

Core Principle 4: Evaluate antimicrobial drug use practices

Participate in continuing education activities to learn about tracking AU.

Implementation Strategies

a. **Review literature that explains how tracking and reporting of AU is done, and why it is important.**
b. **Encourage staff to attend continuing education focused on tracking AU.** Consider having in-house training to show how tracking AU can lead to quality improvement.

Core Principle 5: Educate and build expertise

Conduct all-staff training on hospital AS practice and policy.

Implementation Strategies

a. **Incorporate discussion of AS in regular staff meetings** (e.g., monthly) to discuss hospital progress and to discuss new opportunities and resources for improvement of AU.
b. **Require current and new employees to receive training on the clinic AS policy.** Consider including this as part of other mandatory annual trainings.
c. **Encourage staff to participate in continuing education opportunities on AMR and AS.**

Checklist for Core Principle Implementation - Intermediate

Core Principle 1: Commit to stewardship	Target date	✔
Form an ASC. Identify members, meet regularly, and educate staff.		
Identify an AS Champion. Draft a written statement and have a poster identifying the Champion.		
Make a public commitment to clients. Send letters or email, use talking points, display commitment posters, write a commitment statement, and celebrate USAAW.		
Define hospital AS priorities. Find priorities for initial action, identify protocols to support priorities, educate staff on these issues.		
Draft an AS policy. Draft a document to guide facility action, define staff roles, educate staff about policy, and meet regularly.		
Formalize AS Champion Role. Include AS responsibilities and effort time in the Champion's job description.		
Actively promote responsible AU to clients and public. Celebrate USAAW, and download awareness graphics.		
Define hospital AS priorities. Identify gaps in practice, set AS priorities for intervention, identify supporting protocols, and educate staff.		

Core Principle 2: Prevent common diseases	Target date	✔
Educate clients on preventative care. Promote wellness care and vaccination, empower owners to keep pets healthy.		
Prevent healthcare-associated infections. Review your infection prevention plan with staff.		
Develop prevention protocols for high-priority conditions. Identify conditions, develop protocols, and educate staff.		

Core Principle 3: Select and use antimicrobial drugs judiciously	Target date	✔
Provide clinical guidance for responsible AU. Share broad concepts of responsible AU, use ISCAID guidelines, develop protocols for surgical AU, and identify antibiotic alternatives.		
Develop protocols for use of clinical diagnostics. Ensure best practices for specimen collection.		
Provide clinical guidance for responsible AU. Define additional prescribing guidelines, including for prophylaxis, create a supportive environment for prescribers.		
Implement AS actions to prevent inappropriate prescribing. Incorporate watchful waiting and antibiotic time-outs.		

Core Principle 3: Select and use antimicrobial drugs judiciously	Target date	✓
Review antimicrobials, and identify opportunities for formulary-level action. Set criteria for use of third-line antimicrobials.		
Develop protocols for use of clinical diagnostics. Utilize all available diagnostics, draft protocols to guide C&S recommendation.		

Core Principle 4: Evaluate antimicrobial use practices	Target date	✓
Inventory antimicrobials in your facility. Develop a list (formulary) of antimicrobials, indicate which are considered first-line for common conditions, and discuss among veterinarians.		
Read about and participate in continuing education activities to learn about tracking AU.		

Core Principle 5: Educate and build expertise	Target date	✓
Require staff training. Educate on problem of AMR and antibiotic misuse, and stay up-to-date with email bulletin subscriptions.		
Communicate with pet owners. Use veterinary AU talking points, non-antibiotic prescription pad, and fact sheets.		
Provide information about safe medication disposal. Hang a poster with information about local take back locations.		
Train all staff on AS practice and policy. Incorporate progress discussion into staff meetings, train new employees, encourage AS continuing education.		

Advanced Antimicrobial Stewardship Interventions

In general, advanced AS interventions should build upon an AS program that incorporates basic and intermediate-level interventions, but AS leaders should feel free to implement any actions that are feasible, acceptable, sustainable, and will make an impact in their facilities.

Core Principle 1:
Commit to stewardship

Ensure implementation of commitment strategies from basic and intermediate AS interventions are met.

Core Principle 2:
Advocate for a system of care to prevent common diseases

Align infection prevention and quality improvement priorities with AS actions.

Implementation Strategies
a. **Ensure communication among staff working on infection prevention**, patient care quality improvement, and AS on a routine basis.
b. **Develop a list of multidrug-resistant organisms of concern** and establish a process to ensure identification of these organisms upon receipt of bacterial C&S results.
c. **Define strategies to communicate and initiate IPC action** when a multidrug-resistant organism is detected in hospitalized patients or outpatients.
d. **Track healthcare-associated infections in your clinic** and set goals for improving the rate over time.

Resources

ARSI: List of Infection Prevention and Control Resources. https://arsi.umn.edu/ipc-resources
AAHA: 2018 Infection Prevention, Control, and Biosecurity Recommendations.
https://www.aaha.org/aaha-guidelines/infection-control-configuration/aaha-infection-control-prevention-and-biosecurity-guidelines/
Canadian Committee on Antibiotic Resistance Infection Prevention and Control: Best Practices for Small Animal Veterinary Clinics.
https://oahn.ca/wp-content/uploads/2020/01/OAHN-IPC-Guide-SB-Final-Jan0820_All_tagged-SUR.pdf

Core Principle 3:
Select and use antimicrobial drugs judiciously

Implement AS actions to identify and prevent unnecessary prescribing.

Implementation Strategies
a. **Review prescribing appropriateness.** Use your clinic prescribing protocols as the standard to which you compare actual practice. The findings can be used to identify opportunities for education and targeted intervention. See more on reviewing AU below.
b. **Automate your antibiotic time-outs for hospitalized patients.** See more detail about time-outs in the Intermediate AS Interventions section above. This intervention provides an opportunity for the veterinary team to review the need for, and specifics of, antibiotic therapy. Consider using your practice management software to trigger antibiotic time-outs for

hospitalized patients. In some systems, a reminder can be incorporated as part of an antibiotic order set. With others, it is best to pull a daily report of patients on antibiotics, including the start date, to identify those in need of review (e.g., 48 hours after antibiotic initiation). Record completion of the time-out and any actions taken (e.g., antibiotic stop, change) in the electronic medical record. Doing so is an important part of recording the patient's clinical course and progress, is a way to demonstrate stewardship practice in the medical record, and provides you with data to track staff compliance with time-out completion.

Resources

> **ARSI: Antimicrobial Time-Out Form Template:** Customize this document to incorporate your clinic's antibiotic time-out policy.
> https://arsi.umn.edu/antibiotictimeout

Identify additional opportunities for formulary-level AS action.

Implementation Strategies

a. **Task the ASC with reviewing the practice antimicrobial formulary.** A formulary is a list of all drugs kept on hand for inpatient use or for prescribing to outpatients.
   i. Categorize antimicrobials for recommended use based on the prescribing protocols that the ASC has defined for implementation in your practice, knowledge about the role of each drug in the development of AMR, risk of adverse drug events, and the importance of each antimicrobial to human medicine. An example of such categorization is given in Table 2.
   ii. Ensure continuous access to antimicrobials recommended for first- and second-line prescribing to prevent the need to use more restricted options.
   iii. Consider removing some drugs from the formulary if they are not recommended for routine use in your AS program.
   iv. Remove antimicrobials that are prohibited for use in your practice because of their role as last-line drugs in human medicine.

b. **Establish prior authorization protocols for third-line and selected second-line antibiotics.** Prior authorization is a process of review and approval of antimicrobials before prescription and/or administration.
   i. The AS Champion is the best individual to carry out review for prior authorization. If the AS Champion is not present, another veterinarian thoroughly trained in facility protocols should conduct prior authorization.
   ii. Prior authorization can apply to drugs kept on the practice formulary (e.g., cefovecin), as well as to drugs that are used rarely and must be ordered from an outside pharmacy (e.g., imipenem, meropenem).
   iii. Prior authorization is an internal process of which all veterinarians must be aware, including those providing relief services.
   iv. Documentation of prior authorization is advisable, so that the ASC can monitor compliance with practice protocols and track use of antimicrobial drugs of concern.

Resources

> **AVMA: Guideline for Veterinary Prescription Drugs**.
> https://www.avma.org/KB/Policies/Pages/Guidelines-for-Veterinary-Prescription-Drugs.aspx
> **AVMA: ELDU Algorithm:** Understand the conditions under which a veterinarian can practice extralabel use of approved animal and human drugs and the responsibilities that accompany this privilege.
> https://www.avma.org/KB/Resources/Reference/Pages/AVMA-Extralabel-Drug-Use-ELDU-Algorithm.aspx
> **WHO List of Critically Important Antimicrobials:** International list of critically important antimicrobials for human medicine.
> https://www.who.int/foodsafety/areas_work/antimicrobial-resistance/cia/en/

Develop protocols for use of clinical diagnostics.

Implementation Strategies

Review how diagnostics are utilized in your hospital for conditions treated with antimicrobials. For example, identify what clinical signs or signalment are typically present when urine samples are submitted for analysis and culture or skin swabs for cytology and culture.

a. Determine whether practices vary by veterinarian.

b. Talk to staff to identify barriers to use of diagnostic testing, including C&S. Barriers might include confidence in diagnosis without laboratory diagnostics, turnaround time, lack of time to conduct in-house tests like cytology, client refusal, or clinician's hesitation to offer the test (e.g., because of perception of client's financial constraints).

c. Also identify factors that support use of diagnostic testing. Factors positively associated with use of diagnostics include recurrent infections and treatment failures.[5] These are situations that might be avoided with more timely use of diagnostic testing, which

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[5] Fowler H. et al. A survey of antimicrobial prescribing practices, Washington State 2015. Vet Rec 2016; 179(25).

might also save the client money and prevent adverse outcomes like development of a resistant infection. Since a desire to adhere to best practices has also been associated with use of C&S testing, education and engagement of veterinary staff can be effective.

Resources

BSAVA: Cytology and Culture. https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME/Cytology-and-culture
Cornell University Animal Health Diagnostic Center: Blood culture technique.
https://www.vet.cornell.edu/animal-health-diagnostic-center/testing/protocols/blood-culture-technique
ISCAID: Prescribing guidelines: Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources

Table 2: *Example categorization of a practice antibiotic formulary**

Clinic-Defined Classification	Antibiotic Drugs
Available *Antibiotics to be available at all times to treat a range of common infections.*	Penicillin, amoxicillin, ampicillin, metronidazole Amoxicillin-clavulanic acid Cephalexin, cefadroxil, cefazolin Doxycycline, minocycline Clindamycin, lincomycin Gentamicin Trimethoprim-sulfamethoxazole
Caution *First- or second-line antimicrobials that should be available but used cautiously to avoid development of further resistance. Consider some of these drugs for prior authorization.*	Cefovecin, cefpodoxime Enrofloxacin, orbifloxacin, marbofloxacin, pradofloxacin Erythromycin Amikacin Rifampin Chloramphenicol Fosphomycin
Consult *Third-line (last-resort) antimicrobials that should only be used in severe or rare situations and be prescribed in consultation with veterinary infectious disease or pharmacy expert. These drugs should probably not be kept on-hand and should be obtained only if essential for use.*	Imipenem-cilistatin, meropenem Ciprofloxacin Tigecycline Piperacillin-tazobactam Nitrofurantoin
Avoid *Drugs that should not be used, as they are reserved as last-line therapy for human infections. These drugs should NOT be kept on-hand.*	Vancomycin Linezolid Teicoplanin Colistin, polymixin B

* This is an example table and should only be used for consideration. Antibiotic formularies will vary among practices.

Core Principle 4:

Evaluate antimicrobial drug use practices

Assess compliance with AS actions.

Implementation Strategies

a. **Assess at least some AS actions** that your clinic has implemented. You can track compliance with the intervention and/or related outcomes. For example:
   i. Audit a sample of patient records to ensure that indication, dose, duration, frequency, and route are recorded for all prescriptions.
   ii. Review compliance with antibiotic time-out processes.
b. **Provide clinic-wide metrics and feedback directly to staff members** on their compliance with clinic AS protocols.

Track and report overall AU and prescribing for priority conditions.

Implementation Strategies

a. **In the ASC, determine:**
   i. Whether to track at the level of prescriber or clinic.
   ii. What information to track.
   iii. How to obtain necessary data (e.g., electronic data extraction, list of visits with sales transactions, manual chart review).
   iv. What method to use (e.g., routine data collection or periodic measurement, like collection of data for all patients seen on one day per month).
   v. What to report, to whom, and how often.
b. **Identify a staff member** to lead the tracking initiative.
c. **Develop a database to collect and analyze data** (e.g., Microsoft Excel workbook).
d. **Draft some language to be included in the AU reports** explaining how the data were collected and what the measures mean for your clinic.
e. **If tracking overall AU for outpatients:**
   i. Calculate a prescribing rate as the number of antibiotic prescriptions per the number of visits (e.g., 20 prescriptions/100 visits).
   ii. Consider reporting the prescribing rate by species, antibiotic drug class, age group (e.g., young, adult, senior), disease indication, prescriber (e.g., rate for canine patients is 26 prescriptions/100 visits and for feline patients is 18 prescriptions/100 visits).
f. **If tracking AU for hospitalized patients,** you can calculate antibiotic starts or days of therapy (DOT).
   i. Calculate DOT. The DOT metric reflects the number of days of AU for each patient and for a clinic over a given period of time. Add up the number of days each animal is on an antibiotic ("antibiotic days") and the number of days that each patient is present in the clinic for at least part of the day ("days present"). If the patient is on more than one antibiotic, count the days for each and add them together. It does not matter how many doses the patient has each day of an antibiotic, each antibiotic is counted as one for that day. DOT is equal to antibiotic days/days present and is often reported as DOT per 1,000 patient days. It might be more intuitive to use 100 patient days as the denominator in small clinics. Refer to Table 3 for an example.
   ii. Calculate antibiotic starts. This is an easier approach for inpatient tracking, and involves dividing the number of patients started on an antibiotic by the number of days present. For example, in Table 3, there are three antibiotic starts over the 5-day period (two for Fluffy and one for Chuck).
g. **If tracking AU for specific conditions, follow the guidance above, but only collect information on**

Table 3: *DOT calculation example for period of October 11–October 15.*

Patient	Antibiotic Days	Days Present
Fluffy, the Bichon, was admitted to the clinic at 7am on 10/11. She received SC amoxicillin TID on 10/11 and 10/12, and one dose on 10/13. She received PO enrofloxacin BID on 10/13 and 10/14. Fluffy was discharged on 10/14 at 4pm.	5 3 amoxicillin 2 enrofloxacin	4
Chuck, the Maine Coon, was admitted on 10/11 at 12pm. He received PO metronidazole BID for 5 days (10/11-10/15), and was discharged on 10/15 at 5pm.	5	5
During 10/11-10/15, there were other hospitalized patients, who together contributed 20 days present, but they were not receiving antibiotics.	0	20
Total	10	29

DOT for this example = 10/29 = 0.34
This is the same as 34 DOT per 100 days present or 340/1,000 days.

patients with those conditions. The numerator and denominator of the rate calculation should match. For example, if you are tracking AU for respiratory tract infection (RTI), only include patients diagnosed with RTI in the denominator, not all patients.

h. **Report your prescribing data in meaningful ways.** Consider presenting data by species, antibiotic drug, drug class, age group (e.g., young, adult, senior), disease indication, prescriber. This is especially important if you are trying to decrease use of specific drugs or drug classes (e.g., cefovecin).

Resources

> **CDC: Core Elements of Outpatient Antibiotic Stewardship.** https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html
> **ARSI: Clinical Resources.** https://arsi.umn.edu/as-resources

Review appropriateness of prescribing for priority conditions.

Implementation Strategies

a. **Use your clinic protocols to assess appropriateness of prescribing** when collecting and analyzing AU data.
b. **Calculate cumulative and individual prescriber rates of appropriate prescribing.** Share how the hospital is doing overall, but also provide to each veterinarian data on their individual performance. For example, let veterinarians know that they comply with the clinic's protocol 20% of the time, 50% of the time, or 88% of the time.
c. **Use the appropriateness assessments to guide future interventions** and to set goals for AU improvement.

Resources

> **Banfield Pet Hospital: Are We Doing Our Part to Prevent Superbugs? Antimicrobial Usage Patterns Among Companion Animal Veterinarians:** This report describes how AU practices at Banfield Pet Hospitals align with ISCAID prescribing guidelines. https://www.banfield.com/veterinary-professionals/resources/publications/antimicrobial-usage-patterns-among-companion-anima
> **ISCAID: Prescribing guidelines:** Guidelines for canine and feline respiratory tract and urinary tract disease and for canine superficial bacterial folliculitis include recommendations for diagnostic specimen collection. Find them under the ARSI "Antimicrobial Prescribing Guidelines" tab. https://arsi.umn.edu/as-resources
> **BSAVA: PROTECT ME poster to support guideline-setting.** https://www.bsavalibrary.com/content/chapter/10.22233/9781910443644.chap6_1#supplementary_data

Core Principle 5: Educate and build expertise

Engage with other health disciplines working on AMR and AS.

Implementation Strategies

AMR impacts all species, including humans. AU in any setting can impact our ability to use antibiotics in the future in that and all other settings. Because of this reality, improved antibiotic prescribing must occur in all human and animal health settings. We also must do everything possible to prevent antibiotic contamination of our natural areas. Taking a collaborative One Health approach across human, animal, and environmental health will ensure that we make the best progress possible.

a. **Find out if your state is taking a One Health approach to AS and get involved!** Look for AS continuing education opportunities targeted to all prescribers. If there is an event targeted to human healthcare professionals, consider attending to learn about practices in that setting and to network with others in AS practice.
b. **Engage with a physician in your local area.** Consider having a conversation to learn about the realities for healthcare prescribing. Ask to share materials about antibiotics and pets, and ask for healthcare resources to make available in your hospital.
c. **Don't forget the environment.** Let clients know where to dispose of unneeded medications in your community and promote national drug take-back days. When prescribing controlled drugs or antibiotics, communicate directly with clients about the importance of proper disposal to prevent environmental contamination and drug diversion. The time of an antibiotic change or discontinuation is a great time to remind clients about disposal and that they should not be used by someone else or saved for future use.

Resources

> **MOHASC:** Find resources and tools, information, and Minnesota objectives for stewardship across human and animal health. Subscribe to email bulletins by the link in the upper right-hand corner of the page. https://www.health.state.mn.us/onehealthabx

MDH: One Health Antibiotic Stewardship Resources and Print Materials: Find fact sheets to share with colleagues in other health disciplines, and educate your own clients on the importance of AMR and AS to human, animal, and environmental health. https://www.health.state.mn.us/communities/onehealthabx/materials.html

MPCA: Managing Unwanted Medications. https://www.pca.state.mn.us/living-green/managing-unwanted-medications

National resource: Earth 911: How to Recycle Unwanted and Expired Medications. https://earth911.com/recycling-guide/how-to-recycle-unwanted-or-expired-medications/

Drug Enforcement Agency: National Prescription Drug Take Back Day: These national events provide an opportunity for Americans to prevent drug addiction, overdose deaths, and keep chemicals out of the environment. https://takebackday.dea.gov/

Checklist for Core Principle Implementation - *Advanced*

Core Principle 1: Commit to stewardship	Target date	✔
Form an ASC. Identify members, meet regularly, and educate staff.		
Identify an AS Champion. Draft a written statement and have a poster identifying the Champion.		
Make a public commitment to clients. Send letters or email, use talking points, display commitment posters, write a commitment statement, and celebrate USAAW.		
Define hospital AS priorities. Find priorities for initial action, identify protocols to support priorities, educate staff on these issues.		
Draft an AS policy. Draft a document to guide facility action, define staff roles, educate staff about policy, and meet regularly.		
Formalize AS Champion Role. Include AS responsibilities and effort time in the Champion's job description.		
Actively promote responsible AU to clients and public. Celebrate USAAW, and download awareness graphics.		
Define hospital AS priorities. Identify gaps in practice, set AS priorities for intervention, identify supporting protocols, and educate staff.		

Core Principle 2: Prevent common diseases	Target date	✔
Educate clients on preventative care. Promote wellness care and vaccination, empower owners to keep pets healthy.		
Prevent healthcare-associated infections. Review your infection prevention plan with staff.		
Develop prevention protocols for high-priority conditions. Identify conditions, develop protocols, and educate staff.		
Align infection prevention and quality improvement priorities with AS actions. Ensure communication among staff, identify multidrug-resistant organism of concern, and plan for action if identified. Track healthcare associated infections.		

Core Principle 3: Select and use antimicrobial drugs judiciously	Target date	✔
Provide clinical guidance for responsible AU. Share broad concepts of responsible AU, use ISCAID guidelines, develop protocols for surgical AU, and identify antibiotic alternatives.		
Develop protocols for use of clinical diagnostics. Ensure best practices for specimen collection.		

Provide clinical guidance for responsible AU. Define additional prescribing guidelines, including for prophylaxis, create a supportive environment for prescribers.		
Implement AS actions to prevent inappropriate prescribing. Incorporate watchful waiting and antibiotic time-outs.		
Review antimicrobials, and identify opportunities for formulary-level action. Set criteria for use of third-line antimicrobials.		
Develop protocols for use of clinical diagnostics. Utilize all available diagnostics, draft protocols to guide C&S recommendation.		
Implement AS actions to identify and prevent unnecessary prescribing. Review prescribing appropriateness and automate antibiotic time-outs.		
Identify additional opportunities for formulary-level AS action. Categorize antimicrobials and establish protocols for third-line and selected second-line antimicrobials.		
Develop protocols for use of clinical diagnostics. Review how diagnostics are used for conditions treated with antimicrobials.		
Develop protocols for use of clinical diagnostics. Review how diagnostics are used for conditions treated with antimicrobials.		

Core Principle 4: Evaluate antimicrobial use practices	Target date	✔
Inventory antimicrobials in your facility. Develop a list (formulary) of antimicrobials, indicate which are considered first-line for common conditions, and discuss among veterinarians.		
Read about and participate in continuing education activities to learn about tracking AU.		
Assess compliance with AS actions. Track and report on compliance with selected AS actions.		
Track and report overall AU and prescribing for priority conditions.		
Develop protocols for use of clinical diagnostics. Review how diagnostics are used for conditions treated with antimicrobials.		

Core Principle 5: Educate and build expertise	Target date	✔
Require staff training. Educate on problem of AMR and antibiotic misuse, and stay up-to-date with email bulletin subscriptions.		
Communicate with pet owners. Use veterinary AU talking points, non-antibiotic prescription pad, and fact sheets.		
Provide information about safe medication disposal. Hang a poster with information about local take back locations.		
Train all staff on AS practice and policy. Incorporate progress discussion into staff meetings, train new employees, encourage AS continuing education.		
Engage with other health disciplines working on AMR and AS.		

Resources and references

2010 AAHA Feline Life Stage Guidelines. https://www.aaha.org/aaha-guidelines/life-stage-feline-configuration/background-and-goals/

2019 AAHA Canine Life Stage Guidelines. https://www.aaha.org/aaha-guidelines/life-stage-canine-2019/life-stage-canine-2019/

AAHA 2018 Infection Prevention, Control, and Biosecurity Recommendations.
 https://www.aaha.org/aaha-guidelines/infection-control-configuration/aaha-infection-control-prevention-and-biosecurity-guidelines/

AAHA Guidelines: https://www.aaha.org/aaha-guidelines/what-are-aaha-guidelines/

American Association of Feline Practitioners/AAHA Basic Guidelines of Judicious Therapeutic Use of Antimicrobials.
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Antimicrobial Time-Out Form Template. https://arsi.umn.edu/antibiotictimeout

AVMA Antimicrobial Therapy Do's and Don'ts for Canines.
https://www.avma.org/sites/default/files/resources/AntibioticDoDonts_DOGpdf.pdf

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AVMA Antimicrobial Use and Antimicrobial Resistance FAQ.
https://www.avma.org/KB/Resources/FAQs/Pages/Antimicrobial-Use-and-Antimicrobial-Resistance-FAQs.aspx

AVMA Clinic Posters: Be Careful with Antibiotics.
https://www.avma.org/PracticeManagement/ClientMaterials/Pages/clinic-posters-be-careful-antibiotics.aspx

AVMA Core Principles of AS. https://www.avma.org/KB/Policies/Pages/Antimicrobial-Stewardship-Definition-and-Core-Principles.aspx

AVMA Disposal of Unwanted Medications.
https://www.avma.org/PracticeManagement/Facilities/Pages/disposal-unwanted-medications.aspx

AVMA ELDU Algorithm. https://www.avma.org/KB/Resources/Reference/Pages/AVMA-Extralabel-Drug-Use-ELDU-Algorithm.aspx

AVMA Guideline for Veterinary Prescription Drugs.
https://www.avma.org/KB/Policies/Pages/Guidelines-for-Veterinary-Prescription-Drugs.aspx

AVMA Pet Care website. https://www.avma.org/public/petcare/pages/default.aspx

AVMA Pet Dental Care website. https://www.avma.org/public/PetCare/Pages/Pet-Dental-Care.aspx

AVMA Prescription for Safety: How to Dispose of Unwanted Medicine.
https://ebusiness.avma.org/files/productdownloads/Disposing_unwanted_meds.pdf

Banfield Pet Hospital State of Pet Health. https://www.banfield.com/state-of-pet-health

Banfield Pet Hospital: Are We Doing Our Part to Prevent Superbugs? Antimicrobial Usage Patterns Among Companion Animal Veterinarians.
https://www.banfield.com/veterinary-professionals/resources/publications/antimicrobial-usage-patterns-among-companion-anima

BSAVA PROTECT ME poster. https://www.bsavalibrary.com/content/chapter/10.22233/9781910443644.chap6_1#supplementary_data

BSAVA Cytology and Culture. https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME/Cytology-and-culture

CDC Core Elements of Outpatient Antibiotic Stewardship. https://www.cdc.gov/antibiotic-use/core-elements/outpatient.html

CDC U.S. Antibiotic Awareness Week Toolkit. https://www.cdc.gov/antibiotic-use/week/toolkit.html

CIDRAP Antimicrobial Stewardship Project. http://www.cidrap.umn.edu/asp

Colorado State University Communication Toolbox for Veterinary Professionals.
http://csu-cvmbs.colostate.edu/academics/clinsci/veterinary-communication/Pages/communication-toolbox-for-veterinary-professionals.aspx

Companion Animal Parasite Council. https://capcvet.org/

Cornell University Animal Health Diagnostic Center: Blood culture technique.
https://www.vet.cornell.edu/animal-health-diagnostic-center/testing/protocols/blood-culture-technique

Customizable Commitment Posters. https://www.health.state.mn.us/diseases/antibioticresistance/animal/index.html#commit

Electronic image files of "Only When Needed, O.W.N." antibiotic awareness logo.
https://www.health.state.mn.us/diseases/antibioticresistance/own/index.html

Federation of European Companion Animal Veterinary Associations Advice to Companion Animal Owners on Responsible use of
Antibiotics and Infection Control. https://www.fecava.org/wp-content/uploads/2019/09/FECAVA_petowners_2018_LR1.pdf

How to Use a Clinical Antibiogram. https://arsi.umn.edu/antibiogramhowto

ISCAID prescribing guidelines. https://iscaid.org/guidelines and https://arsi.umn.edu/as-resources

KDHE Feline Upper Respiratory Virus and Feline Viral Cystitis Viral Prescription Pads.
https://public.kfmc.org/sites/hai/SitePages/Resources.aspx

List of Infection Prevention and Control Resources. https://arsi.umn.edu/ipc-resources

MDH Fact Sheet: Antibiotic Use in Companion Animal Veterinary Practice.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/animalcafs.pdf

MDH Fact Sheet: Antibiotic Use in Horses: Changing Expectations.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/horsefs.pdf
MDH Fact Sheet: Antibiotics and the Environment: What You Should Know.
https://www.health.state.mn.us/diseases/antibioticresistance/environment/environmentfs.pdf
MDH Fact Sheet: Antibiotics and Your Pets: What You Should Know.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/abxpetfs.pdf
MDH Fact Sheet: The Truth about Meat and Antibiotics.
https://www.health.state.mn.us/diseases/antibioticresistance/animal/truthmeat.pdf
MDH Fact Sheet: The Truth about Milk and Antibiotics. https://www.health.state.mn.us/diseases/antibioticresistance/animal/truthmilk.pdf
MDH FAQ about Antimicrobial Resistance and Stewardship. https://www.health.state.mn.us/diseases/antibioticresistance/basics/faq.html
MOHASC. https://www.health.state.mn.us/onehealthabx
MPCA Managing Unwanted Medications. https://www.pca.state.mn.us/living-green/managing-unwanted-medications
MVMA AS in Veterinary Medicine Webinar Series. https://www.mvma.org/antibiotic-stewardship-in-veterinary-medicine
Pew Charitable Trusts What Drives Inappropriate Antibiotic Use in Outpatient Care?
https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/06/what-drives-inappropriate-antibiotic-use-in-outpatient-care
Pocket Guide: Antimicrobial Prescribing for Common Small Animal Diseases. https://arsi.umn.edu/pocketguide
Sample AS Champion Commitment Poster. https://www.health.state.mn.us/diseases/antibioticresistance/animal/index.html#commit
Sample Client Handout: Your Pet Does Not Need an Antibiotic Today! https://arsi.umn.edu/noabx
Sample Commitment Letter to Clients. https://arsi.umn.edu/commitmenttoclients
Sample Email to Staff, Identifying the AS Champion. https://arsi.umn.edu/championannouncement
Sample Letter to Staff Communicating Antibiotic Stewardship Priorities. https://arsi.umn.edu/cliniccommitment
Tufts Foster Hospital for Small Animals, Use of Antibiotics in Dogs and Cats Having Surgery.
https://vetmed.tufts.edu/wp-content/uploads/FHSA-AntibioticsUse.pdf
UMN Antimicrobial Resistance Learning Site. https://amrls.umn.edu/
Veterinary Antimicrobial Stewardship Roles and Responsibilities. https://arsi.umn.edu/asroles
Veterinary Antimicrobial Use Talking Points. https://arsi.umn.edu/talkingpoints
WHO List of Critically Important Antimicrobials. https://www.who.int/foodsafety/areas_work/antimicrobial-resistance/cia/en/

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https://qioprogram.org/sites/default/files/editors/141/C310_Field_Guide_20180730_FNL.pdf.

To obtain this information in a different format, contact cavsnet@umn.edu.

Glossary

Antibiogram: Summary of susceptibility testing results for a specific microorganism to an array of antimicrobial drugs. Antibiograms reflect aggregate results from many individual susceptibility tests. They can be compiled at the level of a facility, health system, region, or state.

Antibiotic: A type of medicine that kills or stops the growth of bacteria.

Antimicrobial: A type of medicine that kills or stops the growth of microorganisms. Antibiotics, antifungals, antiparasitics, and antivirals are types of antimicrobials.

Antimicrobial formulary: A list of all drugs kept on hand for inpatient use or for dispensing to outpatients.

Antimicrobial resistance: The ability of a microorganism (including bacteria) to resist the effects of antimicrobials (including antibiotics). Resistant infections can be very difficult to treat.

Antimicrobial stewardship: Improving the way antimicrobials (including antibiotics) are prescribed and used.

Antimicrobial stewardship policy: A formal written document describing antimicrobial (including antibiotics) stewardship initiatives and responsibilities within the clinic.

Antimicrobial susceptibility testing: Laboratory testing performed on microbes to find out if they are susceptible or resistant to one or more drugs.

Antimicrobial time-out: An active reassessment of an antimicrobial prescription 48–72 hours after first administration to allow medical staff to take into account laboratory culture and susceptibility testing results and the patient's response to therapy and current condition.

Broad-spectrum antibiotic: An antibiotic that acts on gram-positive and gram-negative bacteria.

Companion animals: Animals that often share an environment with humans, and defined here as dogs and cats.

Culture and susceptibility: A culture is a test to isolate and identify microorganisms (including bacteria) that can cause an infection, and a sensitivity test assesses the effectiveness of antimicrobials (including antibiotics) in killing or stopping the growth of the isolated microorganism.

Days of therapy: A metric that reflects the number of days of antimicrobial use for each patient and for a clinic over a given period of time.

First-line antibiotics: Antibiotics recommended for initial infection treatment because their use maximizes chance of resolution while minimizing drug-related harms, including patient side effects and development of antibiotic resistance.

Healthcare-associated infections: Infections that patients get while receiving treatment for medical or surgical conditions in human or veterinary settings.

Infection prevention and control: Policies and procedures used to minimize the risk of spreading infections, including in healthcare facilities.

Isolate: Pure samples of a microorganism.

Microorganism: A very small living organism, including bacteria, fungi, parasites, and viruses.

Multidrug-resistant organism: Germs that are resistant to multiple antibiotics that are usually effective for treatment.

Narrow-spectrum antibiotic: An antibiotic that is only able to kill or inhibit limited group of bacteria.

One Health: The understanding that the health of humans, animals, and the environment are connected.

Point prevalence study: A study structured to collect uniform data from one or multiple sites during a specific period of time.

Susceptible: A microorganism that is capable of being affected by the antimicrobial.

Third-line antibiotics: Drugs of last resort, only used after other drug options have failed to produce an adequate response in the patient.

Veterinarian-Client-Patient Relationship: The framework within which antimicrobials and other prescription drugs must be prescribed.

Watchful waiting: An approach to patient care in which the veterinarian believes a patient's illness will likely resolve on its own but remains vigilant in case an antibiotic is later needed. The pet owner is provided with instructions on when and why to follow-up with the veterinarian and given recommendations for non-antibiotic approaches to improve patient comfort.

Acronyms

The following list includes acronyms used in the document. They are defined upon first use.

AAHA	American Animal Hospital Association
AMR	Antimicrobial resistance
ARSI	Antimicrobial Resistance and Stewardship Initiative
AS	Antimicrobial stewardship
ASC	Antimicrobial stewardship committee
AU	Antimicrobial use
AVMA	American Veterinary Medical Association
BSAVA	British Small Animal Veterinary Association
C&S	Culture and susceptibility
CDC	Centers for Disease Control and Prevention
CIDRAP	Center for Infectious Disease Research and Policy
DOT	Days of therapy
ELDU	Extralabel drug use
FAQ	Frequently Asked Questions
FDA	Food and Drug Administration
FeLV	Feline leukemia virus
FIV	Feline immunodeficiency virus
IPC	Infection prevention and control
ISCAID	International Society for Companion Animal Infectious Diseases
KDHE	Kansas Department of Health and Environment
MDH	Minnesota Department of Health
MOHASC	Minnesota One Health Antibiotic Stewardship Collaborative
MPCA	Minnesota Pollution Control Agency
MVMA	Minnesota Veterinary Medical Association
O.W.N.	Only When Needed
RTI	Respiratory tract infection
UMN	University of Minnesota
USAAW	U.S. Antibiotic Awareness Week
UTI	Urinary tract infection
VCPR	Veterinarian-Client-Patient Relationship
WHO	World Health Organization