task force on antimicrobial stewardship in companion animal practice

ACTIVITIES

August 2013 – December 2015

AVMA™ | Advocacy & Public Policy

ACTIVITIES

August 2013 – December 2015

Disclaimer

This report is provided for informational purposes only. The report has not been approved by the AVMA Board of Directors or the House of Delegates, and it is not to be construed as AVMA policy. This report is not intended as a definitive statement on the subject addressed; rather it serves as a resource providing practical information for the reader. If you would like to provide feedback regarding the report's contents, please send your feedback to antimicrobials@avma.org.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice, and the AVMA Board of Directors thanks the members of the Task Force for their hard work in the development of this report.

EXECUTIVE SUMMARY

The AVMA formed the Task Force on Antimicrobial Stewardship in Companion Animal Practice to provide guidance for implementing antimicrobial stewardship in companion animal practice. The membership consists of an interdisciplinary assemblage of professionals from varied backgrounds representing clinical practice, government, infectious disease, pharmacology, industry, and public health. The task force's goal has been to consider the emerging impact of multidrug-resistant organisms in companion animal practice and design approaches to address this challenge.

Collectively, the task force has developed several strategies to help the veterinary profession combat the serious threat of antimicrobial resistance. Some of these activities include devising assessments to better understand laboratory practices and practitioner prescribing behaviors, developing general do's and don'ts of antimicrobial prescribing, supporting the development of local and regional antibiograms, and creating educational programs and materials for practitioners and clients. Enclosed is an assemblage of the committee's work.

The committee recognizes that this is an initial step to raise awareness and encourage broad action by companion animal veterinarians. A key focus of the committee was to assemble "Core Elements" of a companion animal stewardship program. These were meant to encourage all practitioners to create and adopt a clinic-specific plan in which everyone contributes to effective antimicrobial stewardship. It also recognizes that stewardship begins with the appointment of a principal person within the practice to lead the program and to support the practice stewardship goals. Key to success is that practices take a proactive approach to antibiotic use and infection prevention/control using accepted guidelines, recommendations, and expertise. Also with new technologies it will likely become easier to monitor and assess incorporated actions.

This report is provided for informational purposes only. The report has not been approved by the AVMA Board of Directors or the House of Delegates, and it is not to be construed as AVMA policy. This report is not intended as a definitive statement on the subject addressed; rather it serves as a resource providing practical information for the reader. If you would like to provide feedback regarding the report's contents, please send your feedback to antimicrobials@avma.org.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice, and the AVMA Board of Directors thanks the members of the Task Force for their hard work in the development of this report.

The committee recognizes that the time constraints and demands on companion animal practices are great. There is no single template for every veterinary clinic. Also, it is important to implement activities that are not burdensome. Initial implementation of one or a few recommended action(s) may help facilitate success and clinic staff buy-in.

The veterinary profession recognizes that there is a global need to address the complex and troubling escalation of antibiotic resistance. By adopting practices to reduce the development of antimicrobial resistance and adhering to those recommendations, companion animal veterinarians can improve the health of our patients while decreasing the burden on public health. Every veterinary practice can contribute to the reduction of antimicrobial resistance by developing, instituting, and following an antimicrobial stewardship program that works for their particular setting. These assembled materials provide a framework for instituting a clinic level approach.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Committee Members

Jeff B. Bender, DVM, MS, (**Chair**) University of Minnesota, College of Veterinary Medicine, St. Paul, MN, USA

Tamar F. Barlam, MD, MSc, *Infectious Disease Society of America,* Boston Medical Center, Infectious Disease Section, Boston, MA

Reilly P. Glore, DVM, *American Animal Hospital Association,* Brady Veterinary Hospital, Montesano, WA

Nigel Gumley, DVM, MSc, DABVP (C/F) *Canadian Veterinary Medical Association,* Ottawa, ON Canada

Sharon E. Grayzel, DVM, MPH Columbia Veterinary Center, Vancouver, WA

Mike J. Murphy, DVM, JD, PhD, Center for Veterinary Medicine, *Food and Drug Administration.* Rockville, MD

Mark G. Papich, DVM, MS, North Carolina State University, College of Veterinary Medicine, Raleigh, NC

Jane E. Sykes, BVSc (Hons), PhD, DACVIM (SAIM), Department of Medicine and Epidemiology, University of California, Davis. Davis, CA, 95616.

Jeffrey L. Watts, PhD, *Animal Health Institute.* Zoetis, Anti-Infectives Research VMRD, Kalamazoo, MI

Jean M. Whichard, DVM, PhD, *Centers for Disease Control and Prevention*, Atlanta, GA

AVMA Staff

Christine Hoang, Assistant Director, Division of Animal and Public Health

Latoya Gray, Administrative Assistant, Division of Animal and Public Health

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Table of Contents

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

ANTIMICROBIAL STEWARDSHIP IN COMPANION ANIMAL PRACTICE

To provide an overview of antimicrobial stewardship, the following article was published in the Journal of the American Veterinary Medical Association. It highlights the emerging antibiotic resistance problem and activities of the AVMA appointed Task Force.

AVMA Task Force for Antimicrobial Stewardship in Companion Animal Practice
Published Journal of the Veterinary Medical Association, 2015
Bender JB, Barlam TF, Glore RP, Gumley N, Grayzel SE, Hoang C, Murphy MJ, Papich MG, Sykes JE, Watts JL, Whichard JM. Commentary - Antimicrobial Stewardship in Companion Animal Practice. JAVMA 2015;246:287-288.

Companion animal practice is not immune to the global challenge of antimicrobial resistance. Within the past decade, many companion animal practitioners have been confronted with multidrug resistant infections for which there are limited effective antimicrobials. Practitioners are not uncommonly presented with pets infected with multidrug-resistant *Escherichia coli*, *Klebsiella* spp, and *Staphylococcus* spp, including methicillin-resistant *Staphylococcus pseudintermedius*. Fortunately, methicillin-resistant *Staphylococcus aureus* infections are less common in pets than in humans, but they have become a concern in companion animal practice.

Multidrug-resistant infections are often associated with poor treatment outcomes and longer hospital stays. The antimicrobials most effective for these infections are often more expensive than the most commonly used veterinary antimicrobials and can cause more adverse reactions. Additionally, many of these organisms are found in both humans and companion animals, highlighting the possibility of zoonotic transmission.

Today, many human patients are contracting infections that cannot be treated with currently available antimicrobials.[1,2] It is well recognized that with antimicrobial use, there is selective pressure for emergence of resistant bacteria in both human and veterinary medicine. It is estimated that 50% of antimicrobials are unnecessarily or inappropriately prescribed in human medicine,[3] and it seems likely that the percentage in companion animal settings is similar. As such, efforts are needed to promote judicious use of antimicrobials or antimicrobial stewardship. This is important to combat the rise in antimicrobial resistance.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

The term *stewardship* has been widely used as a way to consider how to optimize the use of antimicrobials. This term considers the "benefit of antibiotic use to the patient while minimizing the development of antibiotic resistance and adverse effects on the patient from unnecessary therapy."[4,5] In addition, the Report to the President on Combating Antibiotic Resistance outlines a number of incentives and approaches to encouraging antimicrobial stewardship, including uses in animal agriculture.[4]

Over the past 10 to 15 years, nearly 50% of human health care hospitals have instituted antimicrobial stewardship programs.[4] These programs typically involve a variety of strategies, including prescriber education, hospital formulary restrictions, requiring approval before dispensing of certain antimicrobials, streamlining or de-escalating therapy, and implementing computer-assisted programs that track antimicrobial use and provide clinician guidance.[5] Many of these programs appear to be successful, and initial reviews of their value demonstrate a reduction in the percentage of antimicrobial-resistant organisms in hospitals, a reduction in the occurrence of *Clostridium difficile* infections, improvements in patient outcomes, and reductions in costs.[6-10]

It is possible that some of the antimicrobial stewardship strategies that have been successful in human medicine will also be effective in companion animal practice. Yet, there may be additional strategies that could be used in veterinary medicine. In production animal medicine, a number of practices, such as implementation of quality assurance programs, have been instituted to educate and encourage appropriate antimicrobial use. Recent guidance documents from the US Food and Drug Administration also provide recommendations and guidelines on antimicrobials use in animal agriculture.[11,12]

The AVMA recently formed the Task Force for Antimicrobial Stewardship in Companion Animal Practice to provide guidance for implementing antimicrobial stewardship in companion animal practice. The membership consists of an interdisciplinary assemblage of professionals from varied backgrounds representing clinical practice, government, infectious disease, pharmacology, industry, and public health. The task force's goal has been to consider the emerging impact of multidrug-resistant organisms in companion animal practice and design approaches to address this challenge.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Collectively, the task force has developed several strategies to help the veterinary profession combat the serious threat of antimicrobial resistance. Some of these activities include devising assessments to better understand laboratory practices and practitioner prescribing behaviors, developing general do's and don'ts of antimicrobial prescribing, supporting the development of local and regional antibiograms, and creating educational programs and materials for practitioners and clients. The objective is to roll out these efforts to practitioners over the next year and encourage an active discussion promoting antimicrobial stewardship in companion animal practices.

Other organizations are supporting these stewardship efforts. The International Society for Companion Animal Infectious Diseases has sponsored the development of guidelines for common clinical conditions in veterinary medicine, such as urinary tract disease and superficial pyoderma.[13,14] These efforts represent an urgently needed collaborative and consensus-building activity to provide clinical guidance to veterinary practitioners.

As a profession, we need to clearly recognize the grand challenges of antimicrobial resistance and encourage initiatives that will slow the progression of resistance. Along with the recent activities of the World Health Organization, the CDC, and the Presidential Task Force, the veterinary profession can reduce the selection pressures that favor the spread of antimicrobial-resistant bacterial pathogens. As individual companion animal practitioners, we need to be aware of antimicrobial stewardship and encourage the practice of antimicrobial stewardship principles. Our efforts will need to be broad, multifactorial, and incorporated at the clinic level. Collectively, we need to take action now.

References

1. Centers for Disease Control and Prevention. Antibiotic resistance threats in the United States, 2013. Available at: www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf. Accessed October 7, 2014.
2. File TM Jr, Srinivasan A, Bartlett JG. Antimicrobial stewardship: importance for patient and public health. *Clin Infect Dis* 2014;59(suppl 3):S93–S96.
3. Dellit TH, Owens RC, McGowan JE Jr, et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clin Infect Dis* 2007;44(2):159–177.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

4. President's Council of Advisors on Science and Technology. Report to the President on combatting antibiotic resistance. Available at: www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_carb_report_sept2014.pdf. Accessed November 21, 2014.
5. Society for Healthcare Epidemiology of America, Infectious Diseases Society of America, Pediatric Infectious Diseases Society. Policy statement on antimicrobial stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS). *Infect Control Hosp Epidemiol* 2012;33(4):322–327.
6. Dortch MJ, Fleming SB, Kauffmann RM, et al. Infection reduction strategies including antibiotic stewardship protocols in surgical and trauma intensive care units are associated with reduced resistant gram-negative healthcare-associated infections. *Surg Infect (Larchmt)* 2011;12(1):15–25.
7. Fishman N. Antimicrobial stewardship. *Am J Infect Control* 2006;34(suppl 1):S55–S73.
8. Malani AN, Richards PG, Kapila S, et al. Clinical and economic outcomes from a community hospital's antimicrobial stewardship program. *Am J Infect Control* 2013;41(2):145–148.
9. Schultz L, Lowe TJ, Srinivasan A, et al. Economic impact of redundant antimicrobial therapy in US hospitals. *Infect Control Hosp Epidemiol* 2014;35(10):1229–1235.
10. Singh N, Rogers P, Atwood CW, et al. Short-course empiric antibiotic therapy for patients with pulmonary infiltrates in the intensive care unit. A proposed solution for indiscriminate antibiotic prescription. *Am J Respir Crit Care Med* 2000;162(2 Pt 1):505–511.
11. US Department of Health and Human Services, Food and Drug Administration, Center for Veterinary Medicine. The judicious use of medically important antimicrobial drugs in food producing animals (guidance for industry #209). Available at: http://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM299624.pdf. Accessed October 1, 2014.
12. US Department of Health and Human Services, Food and Drug Administration, Center for Veterinary Medicine. New animal drugs and new animal drug combination products administered in or on medicated feed or drinking water of food-producing animals: recommendations for drug sponsors for voluntary aligned product use conditions with GFI #209 (guidance for industry #213). Available at: http://www.fda.gov/downloads/AnimalVeterinary/GuidanceComplianceEnforcement/GuidanceforIndustry/UCM299624.pdf. Accessed October 1, 2014.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

13.Hillier A, Lloyd DH, Weese JS, et al. Guidelines for the diagnosis and antimicrobial therapy of canine superficial bacterial folliculitis (Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases). *Vet Dermatol* 2014;25(3):163–175.
14.Weese JS, Blondeau JM, Boothe D, 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 Int* 2011;2011:263768.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

UNDERSTANDING COMPANION ANIMAL PRACTITIONERS' ATTITUDES TOWARD ISSUES OF ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

The Task Force developed a veterinary practitioner survey distributed by the AVMA to a random selection of practitioners. Topics included barriers to appropriate antimicrobial use, owners' role in prescription of antimicrobials, and practitioner practices in specific case setting, such as peri-operative antimicrobial use or for routine antibiotic use for dental prophylaxis. The Task Force and AVMA leadership engaged American Animal Hospital Association (AAHA) and Banfield Pet Hospital to also distribute the survey to their veterinarians. The initial survey results were published as a commentary. The AAHA and Banfield Pet Hospital survey results are currently pending.

Commentary

Understanding Companion Animal Practitioners' Attitudes toward Issues of Antimicrobial Stewardship
From the Taskforce for Antimicrobial Stewardship in Companion Animal Practice (TFASCAP)
Published in Journal of the American Veterinary Medical Association, 2015

Grayzel SE, Bender JB, Glore RP, Gumley N, Sykes JE, Whichard, Papich MG, Watts JL, JM Barlam TF, Murphy MJ, Hoang C. Commentary - Understanding Companion Animal Practitioners' Attitudes toward Issues of Antimicrobial Stewardship. J Am Vet Med Assoc 2015;247:883-884.

The Task Force for Antimicrobial Stewardship in Companion Animal Practice was created two years ago and charged with the goal of developing resources and programs to stimulate antimicrobial stewardship in companion animal clinical settings. While the Task Force has been working on strategies to encourage and support these goals, we have also sought to learn more about companion animal practitioners' knowledge and concerns about antibiotic resistance in their patients and as a public health issue. We have done this in the belief that antimicrobial stewardship resources will only be useful to practicing companion animal veterinarians if they address the interests and concerns of veterinarians and if practitioners view stewardship as an important part of their practice and a contribution to their communities.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

To date, there are only a few studies examining antibiotic prescribing behavior and attitudes about antimicrobial resistance among companion animal practitioners in the North America[1, 2, 3]. In this issue of the journal, the results of a survey are reported that examined attitudes and behaviors among veterinarians at North Carolina State University teaching hospital, which adds to our understanding of this complex topic. In an effort to further understand the issues and priorities surrounding antimicrobial stewardship and antibiotic resistance facing practicing companion animal veterinarians, the Task Force also conducted an informal survey of AVMA members on the topic. This survey was distributed to 1,930 AVMA members who identified themselves as companion animal practitioners; 261 veterinarians responded. While this informal survey cannot be construed as being definitive, many of the responses were consistent with findings from published studies. Other findings from the Task Force survey may be used as suggestions for areas of further inquiry and attention.

This survey and previous studies indicate that veterinarians are concerned about antimicrobial resistant pathogens in companion animals. In the survey of faculty, residents, and interns at North Carolina State University, 59% of respondents indicated that they were very concerned about antimicrobial resistant infections.[4] In the Task Force survey, 45% of AVMA members expressed strong concern and an additional 37% indicated that they were somewhat concerned about antimicrobial resistant infections in dogs and cats. The majority (62%) of veterinarians surveyed by the Task Force felt that the way that antibiotics are used in small animal practice has an impact on the overall antibiotic resistance issue.

The Task Force was also interested in exploring barriers to appropriate antimicrobial use in companion animal practice. While faculty, residents, and interns at North Carolina State University rated culture and susceptibility results as most important for choosing antimicrobials for individual patients,[4] 84% of veterinarians who responded to the Task Force survey strongly agreed or somewhat agreed that the cost of culture and susceptibility testing was a barrier to recommending these tests. Among companion animal practitioners in one study in Canada, bacterial culture and susceptibility testing was performed in just 4% of the cases for which antimicrobials were prescribed.[3]

Veterinarians responding to the Task Force survey indicated that they would welcome more guidance regarding the choice of antibiotics for different types of infections (77% strongly agreed or

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

somewhat agreed) and the duration of antimicrobial therapy (83% strongly agreed or somewhat agreed). The gap in knowledge and comfort level for appropriate prescribing among companion animal practitioners was illustrated in a study that examined the antimicrobial prescribing behavior of referring veterinarians for the year prior to patient referral to The Ohio State University veterinary teaching hospital in the United States. That study found that for 197 of 549 cases examined, the duration of administration of antibiotics that had been prescribed was not noted in the record and that dose and route of administration were frequently not included.[1] While the use of guidelines has been linked to an overall decrease in antibiotic use and specifically, the use of third-line antibiotics at The University of Guelph veterinary teaching hospital in Canada[2], the vast majority (88%) of respondents to the Task Force survey were unaware of the existence of antimicrobial use guidelines developed by veterinary professional organizations. Recent examples of prescribing guidelines include the International Society for Companion Animal Infectious Diseases (ISCAID) Antimicrobial Use Guidelines for Treatment of Urinary Tract Disease in Dogs and Cats[5] and the ISCAID Guidelines for the Diagnosis and Antimicrobial Therapy of Canine Superficial Bacterial Folliculitis.[6]

The Task Force survey's results are consistent with findings from previous studies about issues facing companion animal veterinarians with regard to their choices and use of antimicrobials. A lack of data from susceptibility testing, incomplete recordkeeping, and a lack of awareness of prescribing guidelines point to opportunities for stewardship efforts. Providing support and resources for addressing these shortcomings could have an impact on antimicrobial prescribing behavior to reduce antibiotic resistance.

Gathering information about the use of antimicrobials by companion animal veterinarians and the perceptions of these practitioners about antibiotic resistance issues and antimicrobial stewardship programs will help the Task Force tailor our efforts to the needs and interests of practicing small animal veterinarians. Antimicrobial stewardship can encompass a wide array of behaviors, programs, and interventions; not all of these are necessary or feasible in some clinical settings and even small changes can have a positive impact. An antimicrobial stewardship program in a small clinic may look quite different from the efforts of a program in a referral hospital, but every veterinary practice can contribute to the reduction of antimicrobial resistance by developing, instituting, and following an antimicrobial stewardship program that works for their particular setting. By adopting practices based on the best evidence available for reducing the development

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

of antimicrobial resistance and adhering to those recommendations, companion animal veterinarians can improve the health of our patients while decreasing the burden on public health.

References

1. Baker SA, Van-Balen J, Lu B, et al., Antimicrobial drug use in dogs prior to admission to a veterinary teaching hospital. *J Amer Vet Med Assoc* 2012; 241:210-217
2. Weese JS. Investigation of antimicrobial use and the impact of antimicrobial use guidelines in a small animal veterinary teaching hospital: 1995-2004. *J Amer Vet Med Assoc* 2006; 228:553-558.
3. Murphy CP, Reid-Smith RJ, Boerlin P, Weese JS, Prescott JF, Janecko N, McEwen SA. Out-patient antimicrobial drug use in dogs and cats for new disease events from community companion animal practices in Ontario. *Can Vet J*. 2012 Mar;53(3):291-8.
4. Jacob ME, Hoppin JA, Steers N, Davis JL, Davidson G, Hansen B, Lunn KF, Murphy M, Papich MG. Attitudes of Clinical Veterinarians at a U. S. Veterinary Teaching Hospital toward Antimicrobial Use and Antimicrobial-Resistant Infections.
5. Weese JS, Blondeau JM, Boothe D, Breitschwerdt EB, Guardabassi L, Hillier A, Lloyd DH, Papich MG, Rankin SC, Turnidge JD, Sykes JE. 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. *Veterinary Medicine International.* 2011
6. Hillier A , Lloyd DH, Weese JS, Blondeau JM, Boothe D, Breitschwerdt EB, Guardabassi L, , Papich MG, Rankin SC, Turnidge JD, Sykes JE. Guidelines for the diagnosis and antimicrobial therapy of canine superficial bacterial folliculitis Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases). *Vet Dermatol* 2014; 25: 163–e43.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

SURVEY OF VETERINARY DIAGNOSTIC LABORATORIES REGARDING ANTIBIOTIC SUSCEPTIBILITY TESTING

The Task Force developed a survey distributed to private and public veterinary diagnostic laboratories serving companion animal practitioners. Topics addressed in the survey included standards followed for antimicrobial susceptibility testing, how results are reported to veterinarians, and responses to case-specific situations. The Task Force shared this information at the 2015 Clinical Laboratory Standards Institute, veterinary sub-committee annual meeting. Preliminary findings from the survey included the following:

Most (87%) of responding laboratories used CLSI guidelines and most instituted weekly quality control testing. Most laboratories used a variety of susceptibility testing methods including broth microdilution, disk diffusion, and E-test. Most results to practitioners included interpretations of susceptible, intermediate or resistant with few (24%) providing the limits (breakpoints) of those interpretive ranges. Greater than 38% of laboratories included surveillance for carbapenem-resistant Enterobacteriaceae or extended-spectrum β-lactamase (ESBL) producing Enterobacteriaceae. Quantitative or semi-quantitative urine cultures were done by 64% of respondent laboratories.

REGIONAL ANTIBIOGRAMS

The Task Force explored available antibiograms from private laboratories and veterinary teaching hospitals. In addition, the Task Force shared existing antibiograms and data from North Carolina State University, University of California-Davis, and University of Minnesota. Dr. Sykes from the University of California took the initiative to try to compare resistance profiles and noted that each institution did have seemingly different antibiotic profiles. These data suggest the importance of promoting regional antibiogram development.

PARTNER ENGAGEMENT

One key means to promote antibiotic stewardship was the engagement of a broad array of partners. This included engagement of the American Animal Hospital Association (AAHA), Banfield Pet Hospital, and the Canadian Veterinary Medical Association for conducting the practitioner

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

surveys. Additionally, the Task Force engaged the U.S. Centers for Disease Control and Prevention, Get Smart team about their educational outreach strategies and educational materials. They graciously and willingly shared their resources and strategies for engaging the public.
Several committee members were active in providing educational sessions on antimicrobial stewardship to State Veterinary Organizations or One Health conferences. Additionally, committee members provided resources and consultation to other medical and veterinary interested parties in promoting antimicrobial stewardship.

PRACTICE GUIDELINES

The Task Force reviewed existing practice guidelines from expert panels, such as the International Society for Companion Animal Infectious Diseases (ISCAID) and the Federation of European Companion Animal Veterinary Association and felt that these documents supported appropriate antibiotic treatment options. The Task Force encourages other efforts to develop consensus guidelines supporting appropriate antibiotic use for common conditions observed in veterinary practice settings. See https://www.avma.org/KB/Resources/Reference/Pages/Guidance-for-Antimicrobial-Use-in-Companion-Animal-Practice.aspx.

DRAFT – CORE ELEMENTS OF COMPANION ANIMAL ANTIMICROBIAL STEWARDSHIP PROGRAMS

Core Elements

1) Each veterinary practice should commit to the reduction in antimicrobial resistance by creating and adopting a clinic-specific plan in which everyone contributes to effective antimicrobial stewardship.
2) Antimicrobial stewardship in a practice begins with the appointment of a principal person to lead the program and to support the practice stewardship goals with all available resources.
3) Practices should address issues of antibiotic resistance by taking a proactive approach to antibiotic use and infection control using accepted guidelines, recommendations, and expertise.
4) Understanding what is (and what is not) working requires self-assessment and monitoring with a goal of continual improvement.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Introduction

The emergence of antimicrobial resistance compromises our ability to successfully treat bacterial infections in both human and veterinary medicine. This situation is further compounded by the lack of new antibacterial agents in the development pipeline. Veterinarians recognize the need to maintain effectiveness of antimicrobials, a precious and limited resource. Companion animal practice has not been immune to the global challenge of antibiotic resistance. Within the past decade many veterinary practitioners are confronted with multidrug resistant infections where effective antimicrobials are limited. Practitioners now observe patients with multidrug resistant *Escherichia coli*, *Klebsiella* sp., and *Staphylococcus* infections, including the emergent methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) and methicillin-resistant *Staphylococcus aureus* (MRSA). Some of these may be community acquired or occur in the clinic setting. The isolation of invasive and potentially nosocomial bacteria in the clinic setting are often associated with poor treatment outcomes and longer hospital stays. Additionally, many of these organisms are found in both humans and companion animals, highlighting the potential zoonotic movement between species.

A recent survey of AVMA members reported that 82% of respondents were strongly or somewhat concerned about antimicrobial resistant infections in dogs and cats .[2] Sixty-two percent of veterinarians surveyed by the Task Force felt that the way that antibiotics are used in small animal practice has an impact on the overall antibiotic resistance issue.[2]

As a result of these increasing concerns, human and veterinary medicine recognize a need to develop and promote antibiotic stewardship programs.[1,3,4] The term *antimicrobial stewardship* means that there is a coordinated effort to promote the appropriate use of antimicrobials with the goal of reducing the potential for resistance and improving patient outcomes.

The AVMA's Task Force on Antimicrobial Stewardship in Companion Animal Practice was established to promote antimicrobial stewardship in companion animal practice.[1] Although, antibiotic stewardship is a voluntary activity, every veterinary practice can contribute to the reduction of antimicrobial resistance by developing, instituting, and following an antimicrobial stewardship program that works for their particular setting. An antimicrobial stewardship program in a small clinic may look quite different from the efforts of a program in a referral hospital. Even small changes can have a positive impact. These programs demonstrate the veterinary professions'

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

goal to set an example for thoughtful use of antimicrobials and hopefully decrease the risk of antimicrobial resistance.

In human medicine, stewardship program successes include reduced health care costs and improved patient outcomes, such as reduced adverse drug reactions, and fewer antibiotic induced infections (i.e. *Clostridium difficile* infections).[5,6,7]

This document summarizes core elements for a veterinary clinic stewardship program. It builds on previous programs that support infection control efforts and appropriate antibiotic use established from other organizations including the American College of Veterinary Internal Medicine[11] and the National Association of State Public Health Veterinarians.[3,9] There is no single template for every veterinary clinic. However, this program supports a broad interdisciplinary effort to address the significant problem of antibiotic resistance.

Summary of Core Elements of Companion Animal Stewardship Programs[3]

- Clinic/practice commitment
- Responsibility and authority
- Action for Judicious Antibiotic Use
- Surveillance: tracking, monitoring and measurable outcomes
- Resources and education

Clinic/Practice Commitment

Veterinary practice leadership is important to the success of antibiotic stewardship programs. Clinic personnel must recognize that antimicrobial resistance is an emerging problem that can impact effectiveness of antimicrobials in their patients and understand the general concepts that allow for the development of antimicrobial resistance and pathogen spread. This includes a team approach involving owners, associate veterinarians, veterinary technicians, and other staff. Clinic activities may include:

- Develop practical, clinic-specific activities that support stewardship activities
- Provide periodic educational opportunities to inform staff of current issues and control efforts.
- Review antibiotic prescribing practices periodically in the context of new information.
- Educate clients on importance of stewardship and clinic efforts.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Responsibility, Authority, and Drug Expertise

An appointed program lead (such as a clinic veterinarian) is critical to the success of the stewardship program. The program lead should be an advocate for the stewardship program and may seek additional training and resources to support broad infection control and antibiotic stewardship principles. Additional clinic and staff resources could include access to a current drug formulary, a regional antibiogram, standard practice guidelines (e.g. published UTI or bacterial folliculitis guidelines)[8,10], textbooks (e.g. basic microbiology or clinical infectious disease texts), access to high-quality continuing education (CE) programs, drug package inserts, or online resources (e.g. training modules). The program lead should also be able to identify additional experts to support pharmacology or microbiology questions as they arise. These may include university specialists, pharmacists, technical consultants affiliated with pharmaceutical companies, or diagnostic laboratory veterinary services. In addition, the program lead should be familiar with and promote standard infection control.[9]

Actions for Judicious Antibiotic Use

Key Points

- Adhere to AVMA policies on Judicious Therapeutic Use of Antimicrobials
- Develop written clinic-specific policies that support a stewardship program.
- Adopt antibiotic use protocols considering appropriate doses, frequency, and the recommended duration of treatment.
- Consider other effective (non-antimicrobial) therapeutic options to optimize patient care.
- Implement policies and intervention in a stepwise manner over time to maximize chance of success at each stage.

Actions should be tailored to the clinic considering the availability of resources and personnel. Additionally, it is important to implement activities that are not burdensome. Initially, implementing one or a few recommended action(s) may help facilitate success and clinic staff buy-in.

An initial focus may be on a specific target area (i.e. approach to dermatologic diseases or urinary tract infections) within the practice, based on discussions with clinic staff. A review of clinical records is helpful to identify the area that needs attention and can have the greatest impact on optimizing antibiotic use. The target area could be defined as a disease system such as those patients with urinary, dermatologic, respiratory, gastrointestinal, dental, surgical, vector-borne, or reproductive diseases (see

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

AVMA “Antimicrobial Do’s and Don’ts”). Antibiotics are often prescribed empirically while diagnostic information is being obtained. It is imperative to document indication in addition to dose, frequency, and duration on patient records. Making this information accessible helps ensure that antibiotics are modified as needed or discontinued in a timely manner.

It is important to review clinical response and any adverse events. Ideally veterinarians should re-evaluate antibiotics therapy 48-72 hours after antibiotics are initiated (i.e. an antibiotic time-out). This can include encouraging rechecks and/or phone follow-up depending on complexity of condition to ensure client compliance and timely updates on refractory cases.

An antibiotic “time out” prompts a reassessment of the continuing need and choice of antibiotics when the clinical picture is clearer and more diagnostic information is available. Just as the decision to begin antibiotic treatment requires careful consideration, there should also be thought given as to when to stop.

- Does this patient have an underlying disease that will be successfully treated with antibiotics?
- If culture results are available, is the bacterial isolate the cause of disease, a secondary invader, or a contaminant?
- Do laboratory results and clinical findings confirm the need for antibiotics?
- If so, is the patient on the appropriate antibiotic(s), dose, and route of administration. Can the duration be shortened?

The use of infection and syndrome-specific guidelines (e.g. urinary tract infections or bacterial folliculitis)[8,10] can be integrated into veterinary clinic policies to standardize and improve prescribing practices.

In addition, the clinic should review its infection control policies and procedures. Resources are available to help set up a “model” infection control program (http://www.nasphv.org/documentsCompendia.html).[9] There should be protocols in place for procedures to handle patients with antibiotic-resistant infections. A person appointed to oversee infection control can also serve to support antibiotic stewardship principles and monitor for antibiotic resistant organisms.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Measuring progress: tracking, monitoring and measurable outcomes

Means to monitor antibiotic prescribing and resistance patterns are more readily available in human clinical medicine. This is largely due to resources and available technology that allow for tracking. At this time it may not be feasible to accurately monitor antibiotic use and prescribing behaviors in all veterinary clinics. Nor is there any national antibiotic resistance monitoring for companion animals as there is for food-producing animals.[12] There is no coordinated effort to track antibiotic use in animals. More resources should be allocated to the development of such programs. In the meantime, continued engagement with the technology industry may aid in developing clinic specific software that can track measurable and timely information on antibiotic use and resistance for veterinarians. The veterinary profession should encourage companies to develop electronic technologies that support in-clinic stewardship efforts as well as alerts for individual patient care (e.g. for dose optimization and avoidance of drug interactions.)

Additionally, clinics should engage their veterinary diagnostic laboratories to provide clinic or regional antibiograms.[13]

The practice could periodically review a subset of clinical cases diagnosed with a specific disease syndrome (e.g. upper respiratory infections (URI) in cats, urinary tract infections and canine pyoderma). The review could consider the following questions:

- What percentage of cases had specimens submitted for culture?
- What is the frequency of resistance to empirically used antibiotics?
- What is the frequency of infections that are identified as multidrug resistant organism (MDRO)? Are the antibiotic resistant infections associated with a particular procedure (e.g. TPLO) or treatment area of the hospital (e.g. surgical suite, critical care area, isolation)?
- In addition to dose, frequency and duration, was the indication for antibiotic therapy noted in the medical record?
- Was appropriate diagnostic testing offered or performed to identify an underlying cause?
- Could other therapeutic options (e.g. topical therapy) have been used?

This type of evaluation would stimulate dialogue among clinicians and encourage active discussion about appropriate antibiotic choices.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Resources and Education

Veterinary clinics should promote activities and provide resources to support clinic staff education on antibiotic prescribing, antibiotic resistance, and infection control. These can include State or regional resources that highlight changing trends as well as forum that facilitate discussion on interpretation of laboratory findings and optimum prescribing behaviors. Clinics can utilize a number of resources provided by AVMA to promote education of veterinarians and staff.

Summary

Summary Points:

- Create a clinic-specific document involving all staff and areas in antimicrobial stewardship.
- Appoint a principal clinic staff person (veterinarian or technician) to oversee clinic plans
- Use accepted guidelines (see ISCAID, JAVMA) and expertise to keep plans current and active.
- Meet periodically to review clinic program and areas that need improvement (i.e. every 3 months); adjust plans and goals as needed.

There is a global need to address the complex and troubling escalation of antibiotic resistance. By adopting practices to reduce the development of antimicrobial resistance and adhering to those recommendations, companion animal veterinarians can improve the health of our patients while decreasing the burden on public health. Every veterinary practice can contribute to the reduction of antimicrobial resistance by developing, instituting, and following an antimicrobial stewardship program that works for their particular setting. These “Core Elements” provide a framework for instituting a clinic level approach. For additional information see additional materials provided on the AVMA website.

References

1. AVMA Task Force for Antimicrobial Stewardship in Companion Animal Practice. Antimicrobial stewardship in companion animal practice. *J Am Vet Med Assoc*. 2015;246(3):287-288. doi: 10.2460/javma.246.3.287 [doi].
2. AVMA Task Force for Antimicrobial Stewardship in Companion Animal Practice. Understanding companion animal practitioners’ attitudes toward antimicrobial stewardship. *J Am Vet Med Assoc*. 2015;247(8):883-884. doi: 10.2460/javma.247.8.883
3. CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Altanta, GA: US Department of Health and Human Services, CDC; Available at http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html
4. Dellit TH, Owens RC, McGowan JE Jr, et al. Infectious Diseases Society of America and the Society for

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. *Clin Infect Dis* 2007;44(2):159–177.
5. Fishman N. Antimicrobial stewardship. *Am J Infect Control* 2006;34(suppl 1):S55–S73.
6. Malani AN, Richards PG, Kapila S, et al. Clinical and economic outcomes from a community hospital's antimicrobial stewardship program. *Am J Infect Control* 2013;41(2):145–148.
7. Schultz L, Lowe TJ, Srinivasan A, et al. Economic impact of redundant antimicrobial therapy in US hospitals. *Infect Control Hosp Epidemiol* 2014;35(10):1229–1235.
8. Hillier A, Lloyd DH, Weese JS, et al. Guidelines for the diagnosis and antimicrobial therapy of canine superficial bacterial folliculitis (Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases). *Vet Dermatol* 2014;25(3):163–175.
9. NASPHV. Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel. Available http://www.nasphv.org/Documents/VeterinaryPrecautions.pdf
10. Weese JS, Blondeau JM, Boothe D, 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 Int* 2011;2011:263768.
11. Weese JS, Giguere S, Guardabassi L, et al. ACVIM consensus statement on therapeutic antimicrobial use in animals and antimicrobial resistance. *J Vet Intern Med*. 2015;29(2):487-498. doi: 10.1111/jvim.12562 [doi].
12. Reference NARMS program (http://www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/NationalAntimicrobialResistanceMonitoringSystem/)
13. Clinical and Laboratory Standards Institute (CLSI). *Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data;Guideline—Fourth Edition*. CLSI document M39 (ISBN 1-56238-000-0). Clinical and Laboratory Standards Institute, 950 West Valley Road, Suite 2500, Wayne, Pennsylvania 19087 USA, 2014.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

EDUCATION MATERIALS

The following educational materials were developed by the Task Force. This includes materials designed for the exam room (Figure 1 and 2) and a general fact sheet for veterinarians (Figure 3).

These materials are available to AVMA members on the AVMA website (https://www.avma.org/KB/Resources/Reference/Pages/Guidance-for-Antimicrobial-Use-in-Companion-Animal-Practice.aspx).

Acknowledgement: The Task Force greatly appreciates the AVMA marketing and communications group who worked with the Task Force and designed the following educational materials.

Figure 1. Example exam room poster for clinics (cats)

Figure 2. Example exam room poster for clinics (dogs)

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Figure 3. Draft materials for the veterinarian
(additional and more in-depth materials are available on the AVMA website)

This report is provided for informational purposes only regarding the use of antimicrobials in companion animals. The information in this report has not been approved by the AVMA Board of Directors or the House of Delegates, and it is not to be construed as AVMA policy. This report is not intended as a definitive statement on the subject, but rather to serve as a resource providing practical information for the reader. If you would like to provide feedback regarding the report's contents, please send your feedback to antimicrobials@avma.org.

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

NEXT STEPS AND RECOMMENDATIONS

General

- Support One Health activities that address the global antimicrobial resistance issue.
- Continue to engage public and private partners to support antimicrobial stewardship efforts.
- Dedicate resources (i.e. financial and personnel) to support antimicrobial stewardship activities.
- Support research monitoring the emergence of antibiotic resistant organisms in companion animals.

Companion Animal Clinic Support

- Support on-going efforts to understand veterinary prescription practices to develop educational programs and assess practitioner knowledge.
- Consider development of best practices for infection control and prevention.
- Engage veterinary electronic record systems develop user-friendly means to measure antibiotic use and culture results.
- Encourage specific incorporation of the "Core Elements" by veterinary clinics. This could include the development of a marketing campaign with user friendly materials to support monitoring use and resistance and educational materials.

Education (Veterinary Student and Continuing Education)

- Encourage on-going education of veterinary practitioners regarding antimicrobial stewardship through continuing education and veterinary student training.
- Encourage sharing of antimicrobial stewardship training curriculum across AVMA accredited veterinary schools

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.

Laboratory Practices

- Encourage best practices by laboratories and the development of practice-friendly antibiograms and materials to meet clinic and patient needs.
- Continue to encourage Clinic and Laboratory Standards Institute to develop veterinary specific breakpoints.
- Explore how regional antibiograms could be developed and provide guidance for companion animal veterinarians.

Practice Guidelines

- Encourage continued development, revision, and distribution of practice guidelines to promote optimum antibiotic treatment such as treatment guidelines for urinary tract infections in dogs and cats and superficial folliculitis in dogs.

Public Education

- Continue to work with the AVMA marketing and communications staff in the development of clinic friendly and client focused educational materials.
- Collaborate with national partners such as the CDC “Get Smart” program to co-develop and provide visible access to materials for clients

This report was prepared by the AVMA Task Force on Antimicrobial Stewardship in Companion Animal Practice and the AVMA Board of Directors would like to thank the members of the Task Force for their hard work in the development of this report.