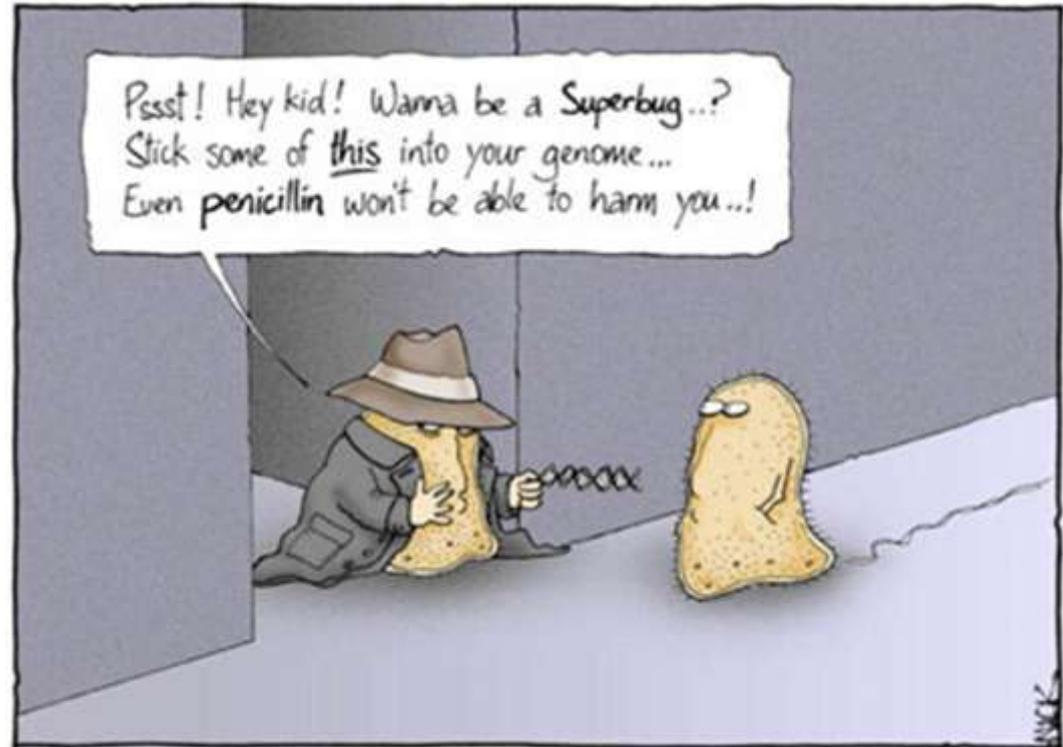


Antibiotic Stewardship for Companion Animal Practice

Jeff Bender DVM, MS DACVPM
Hospital Epidemiologist
University of Minnesota
College of Veterinary Medicine



It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.



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Outline

- Overview of antimicrobial resistance in companion animals
- Stewardship programs
- AVMA Task Force activities
- Educational and outreach



Drug Resistant Infections in Companion Animals

- Methicillin-resistant *Staphylococcus pseudintermedius* and *Schlieferi*
- Methicillin-resistant *Staphylococcus aureus*
- MDR *E. coli* and *Klebsiella*



Companion Animals and Antimicrobial Resistance

- Pets, especially cats and dogs are potential sources of spread of antimicrobial resistance due to common use of antimicrobials and their close contact with humans.

Guardabassi et. al. J Antimic Chemo 2004;54:321-32



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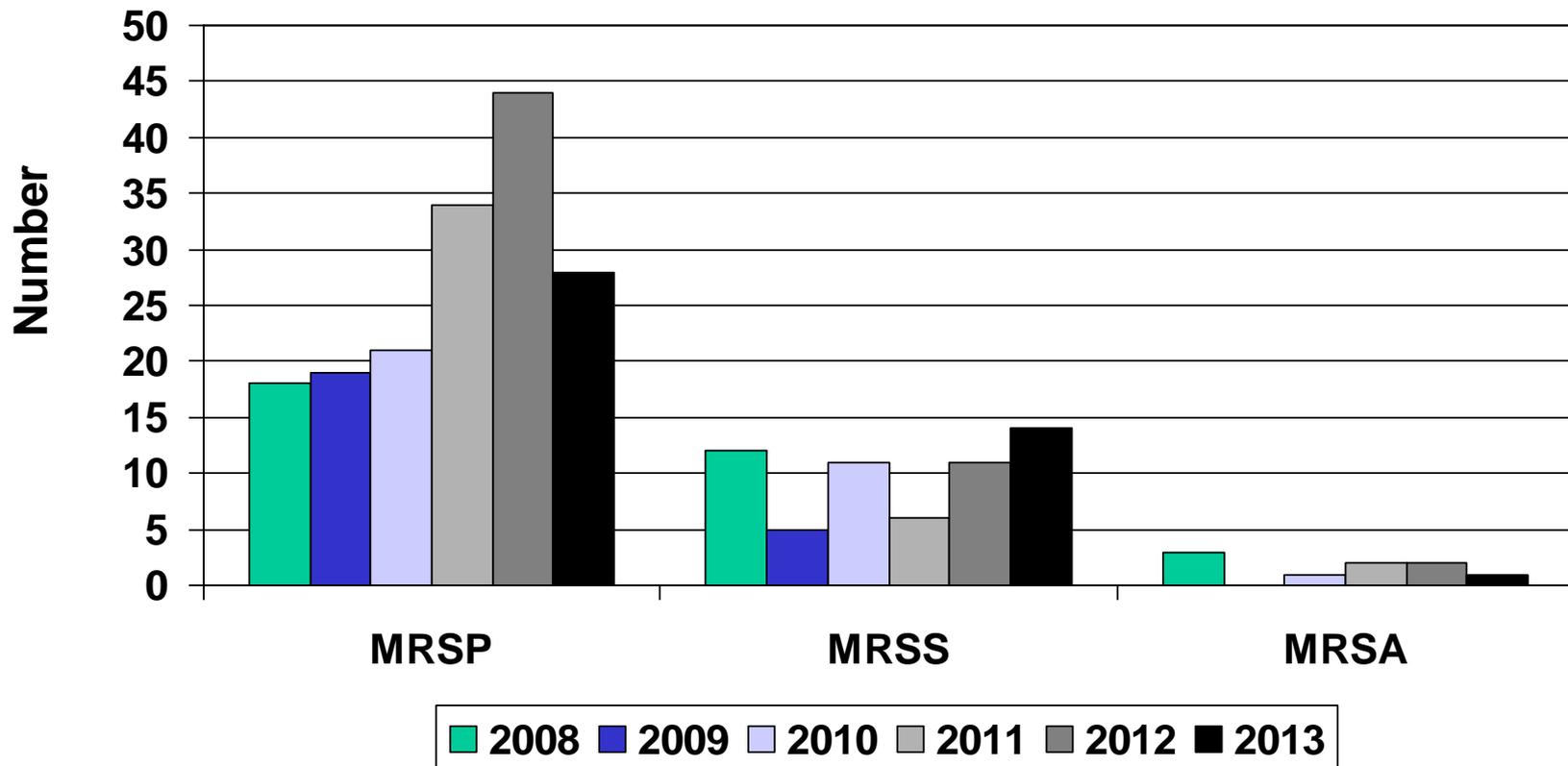
Companion Animals and Antimicrobial Use

- In 2002, companion or non-food animals accounted for 37% of the pharmaceutical products sales in the EU
- Lack of bacterial identification and antimicrobial susceptibility
- Pets often receive medically important antimicrobials (i.e. cephalosporins or fluoroquinolones)

Guardabassi et. al. J Antimic Chemo 2004;54:321-32



Clinically related *Staphylococcus* sp. identified through the Dermatology Service University of Minnesota VMC, 2008-2013



Dog Park Study

Minneapolis/St. Paul (n=22)

50 (27%) of 186 samples were *E. coli* positive

- 46 (25%) of *E. coli* positive samples were AmpC positive
- 4 (2%) of *E. coli* positive samples were extended spectrum beta-lactamase (ESBL) producers
- Many of these isolates were multidrug resistant



Figure 2. Typical example of a Twin Cities area dog park.



Veterinary Medical Center ICU Survey

Source	# of <i>E. coli</i> Isolates	Pansensitive ¹ n (%)	MDR ² n (%)
Community Practice	102	70 (69%)	4 (4%)
ICU	113	42 (37%)	42 (37%)

1 Sensitive to all antimicrobials on the panel

2 Multi-drug resistant Chi-square = 37.9; p<0.0001



Selective Pressures (The Why)

- Regardless of use (appropriate or inappropriate), the selective pressure of antibiotics underscores the importance of prudent use to slow the development of resistance

Fishman N. AJIC 2006



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Inappropriately Prescribed, Why?

- Absence of bacterial infection or an indication for prophylaxis
- Violation of one of the following “D’s”
 - The right **D**ose
 - The right **D**rug
 - The best route of **D**elivery
 - Attention to **D**e-escalation
 - The appropriate **D**uration of administration



Stewardship

- “The primary purpose of stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms, and the emergence of resistance.”

Fine TM et. al. 2014 Clin Infect Disease



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Commonly Used Tactics

- Clinician education
- Formulary optimization
- Antibiotic use restrictions
- Prospective audit with intervention and feedback
- Optimization of dose administration
- Streamlining: de-escalation and elimination of redundant therapy
- Early switch from IV to oral
- Appropriate duration of antibiotic therapy
- Clinical guidelines with site specific treatment pathways

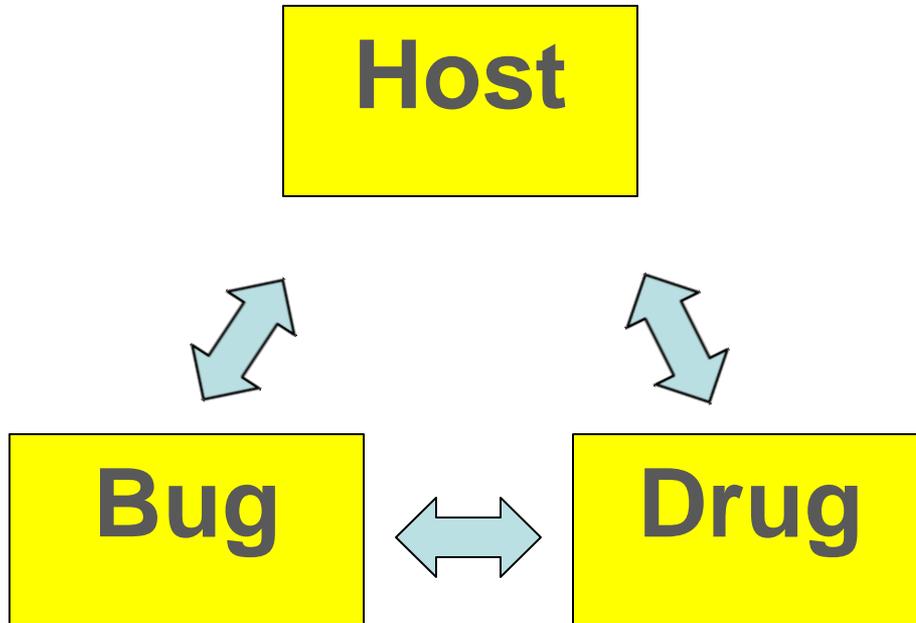


General Recommendations

- Treat infection not colonization
- Ideally, culture before Abx treatment , but provide Abx as soon as possible
- Evaluate patient daily, especially within 48-72 hours (take routine antibiotic “time out”)



Antibiotic “time out”



- Re-evaluate Abx therapy:
- Clinical response
- Microbiologic data
 - Organism
 - Local antibiogram
 - Isolate susceptibility



AVMA Task Force for Antimicrobial Stewardship in Companion Animal Practice

- Understand practitioner prescribing behaviors
- Understand laboratory practices
 - Support regional/hospital antibiograms
- Encourage development of practice guidelines
- Promote educational programs
 - Do's and Don'ts recommendations



Survey of Practitioner Prescribing Practices

- Need to understand the knowledge, attitudes and beliefs of veterinarians
- In a 2011 University of Minnesota survey of companion animal veterinarians
 - 85% did not perceive antimicrobial resistance as a problem in their daily clinical practice



Survey of Influences of Choosing an Antibiotic

- The most influential reasons for choosing a specific antimicrobial were:
 - owner finances (68%)
 - antimicrobial resistance concerns (64%)
 - side effects (52%)
 - client expectations (51%).

Voss and Bender Unpublished



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Veterinarian Practices

- 30% of practitioners reported routinely using antimicrobials for clean surgical procedures, such as ovariohysterectomies, castrations, or uncomplicated mass removal
- Upcoming AVMA survey

Voss and Bender Unpublished



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Influences of Laboratory Standards

- Does the laboratory you use follow quality assurance standards – Clinical and Laboratory Standards Institute (CLSI)?
- AVMA sponsored survey of laboratory practices and how they report back to practitioners





VMC ANTIBIOGRAM 2010-2013

A reference guide for clinicians choosing appropriate antibiotics prior to obtaining culture and sensitivity results.

Susceptibilities were determined using isolation information from Marshfield Laboratories. This information is provided only as a guide to empiric therapy; clinical circumstances should be considered and therapy tailored accordingly.

Consult the Pharmacist, Lab, or Infection Control for questions regarding this antibiogram.

UNIVERSITY OF MINNESOTA VETERINARY MEDICAL CENTER
1365 GORTNER AVENUE, ST. PAUL, MN 55108
612-626-VETS (8387)

WWW.UMNVETS.COM

<i>Staphylococcus intermedius</i> ear	2010-2011 Canine	2012 Canine	2013 Canine (Jan-early Dec)
Antimicrobial	% Susceptible (n tested)	% Susceptible (n tested)	% Susceptible (n tested)
Ampicillin	0.07% (n=14)	22% (n=32)	17.2% (n=29)
Amoxicillin/Clavulanate	28.6% (n=14)	68.8% (n=32)	82.8% (n=29)
Amikacin	N/A	78.1% (n=32)	79.3% (n=29)
Cefazolin	N/A	68.8% (n=32)	86.2% (n=29)
Cefofoevin	N/A	68.8% (n=32)	86.2% (n=29)
Cefpodoxime	N/A	68.8% (n=32)	86.2% (n=29)
Ceftiofur	N/A	78.9% (n=19)	N/A
Cephalothin	28.6% (n=14)	N/A	N/A
Ciprofloxacin	0% (n=4)	N/A	N/A
Clindamycin	43% (n=7)	78.1% (n=32)	75.9% (n=29)
Chloramphenicol	83.3% (n=6)	100% (n=32)	82.8% (n=29)
Doxycycline	N/A	62.5% (n=32)	75.9% (n=29)
Enrofloxacin	27.3% (n=11)	78.1% (n=32)	86.2% (n=29)
Erythromycin	28.6% (n=14)	78.1% (n=32)	72.4% (n=29)
Gentamicin	71.4% (n=14)	68.8% (n=32)	60% (n=29)
Levofloxacin	0% (n=4)	N/A	N/A
Linezolid	100% (n=4)	N/A	N/A
Marbofloxacin	43% (n=14)	78.1% (n=32)	93.1% (n=29)
Mupirocin	N/A	100% (n=5)	100% (n=5)
Neomycin	27.3% (n=11)	N/A	N/A
Orbifloxacin	27.3% (n=11)	N/A	N/A
Oxacillin	29% (n=14)	68.8% (n=32)	86.2% (n=29)
Penicillin	33.3% (n=3)	21.9% (n=32)	15.6% (n=32)
Rifampin	N/A	100% (n=32)	100% (n=29)
Tetracycline	14.3% (n=14)	N/A	N/A
Trimethoprim/Sulfamethoxazole	43% (n=14)	75% (n=32)	89.7% (n=29)
Vancomycin	100% (n=4)	N/A	N/A

<i>S. intermedius</i> skin	2010 Canine	2011 Canine	2012 Canine	2013 Canine
Antimicrobial	% Susceptible (n tested)			
Ampicillin	0% (n=0)	7% (n=4)	19% (n=37)	19% (n=37)
Enrofloxacin	83% (n=10)	84% (n=51)	84% (n=164)	76% (n=149)
Ceftiofur	N/A	N/A	78% (n=69)	N/A
Clavamox	75% (n=9)	100% (n=61)	76% (n=149)	72% (n=140)
Trimethoprim/Sulphamethoxazole	83% (n=10)	75% (n=46)	78% (n=188)	72% (n=139)
Tetracycline	75% (n=9)	59% (n=36)	65% (n=128)	61% (n=118)
Cefovecin	N/A	N/A	75% (n=147)	72% (n=140)
Cephalothin	75% (n=9)	100% (n=4)	N/A	N/A
Gentamicin	83% (n=10)	90% (n=55)	72% (n=143)	71% (n=138)
Marbofloxacin	92% (n=11)	98% (n=60)	90% (n=178)	88% (n=172)
Oxacillin	83% (n=10)	100% (n=61)	76% (n=151)	72% (n=140)
Amikacin	N/A	N/A	80% (n=156)	77% (n=151)
Chloramphenicol	100% (n=12)	92% (n=55)	93% (n=185)	89% (n=174)
Clindamycin	83% (n=10)	83% (n=50)	74% (n=146)	65% (n=127)
Cefpodoxime	N/A	N/A	75% (n=147)	72% (n=140)
Ticaricillin	N/A	N/A	81% (n=166)	75% (n=117)
Ticaricillin/Clavulanate	N/A	N/A	89% (n=184)	83% (n=131)
Penicillin	0% (n=0)	7% (n=4)	19% (n=37)	19% (n=37)
Cefazolin	N/A	N/A	76% (n=149)	72% (n=140)
Erythromycin	N/A	N/A	74% (n=146)	64% (n=125)
Mupirocin	N/A	100% (n=58)	100% (n=180)	99% (n=177)
Rifampin	N/A	N/A	96% (n=190)	100% (n=195)

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Practice Guidelines

Veterinary Dermatology

Vol Dermatol 2014

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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)

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Background – Superficial bacterial folliculitis (SBF) is usually caused by *Staphylococcus pseudintermedius* and routinely treated with systemic antimicrobial agents. Infection is a consequence of reduced immunity associated with alterations of the skin barrier and underlying diseases that may be difficult to diagnose and resolve; thus, SBF is frequently recurrent and repeated treatment is necessary. The emergence of multiresistant bacteria, particularly methicillin-resistant *S. pseudintermedius* (MRSP), has focused attention on the need for optimal management of SBF.

Objective – Provision of an internationally available resource guiding practitioners in the diagnosis, treatment and prevention of SBF.

Development of the guidelines – The guidelines were developed by the Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases, with consultation and advice from diplomates of the American and European Colleges of Veterinary Dermatology. They describe optimal methods for the diagnosis and management of SBF, including isolation of the causative organism, antimicrobial susceptibility testing, selection of antimicrobial drugs, therapeutic protocols and advice on infection control. Guidance is given for topical and systemic modalities, including approaches suitable for MRSP. Systemic drugs are classified in three tiers. Tier one drugs are used when diagnosis is clear cut and risk factors for antimicrobial drug resistance are not present. Otherwise, tier two drugs are used and antimicrobial susceptibility tests are mandatory. Tier three includes drugs reserved for highly resistant infections; their use is strongly discouraged and, when necessary, they should be used in consultation with specialists.

Conclusions and clinical importance – Optimal management of SBF will improve antimicrobial use and reduce selection of MRSP and other multiresistant bacteria affecting animal and human health.

Introduction

In dogs, superficial bacterial folliculitis (SBF) is the commonest form of canine pyoderma, which is in turn, the principal reason for antimicrobial use in small animal practice.^{1–3} As we face the problem of increasing antimicrobial resistance in both human and veterinary medicine, there is a pressing need for prudent and more focused use of antimicrobial drugs (AMDs). In the human field, adoption of guidelines for antimicrobial use at the hospital level has been shown to improve prescribing practices significantly, both alone and as part of broader antimicrobial stewardship programmes.^{4–6} Similar

Accepted 2 January 2014

These guidelines were summarized in a presentation at the American College of Veterinary Internal Medicine Congress in New Orleans 2012 by D. H. Lloyd and a presentation at the 7th World Congress of Veterinary Dermatology in Vancouver, Canada 2012 by A. Hillier.

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Conflicts of interest: No conflicts of interest have been declared.

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Research Article

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

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Urinary tract disease is a common reason for use (and likely misuse, improper use, and overuse) of antimicrobials in dogs and cats. There is a lack of comprehensive treatment guidelines such as those that are available for human medicine. Accordingly, guidelines for diagnosis and management of urinary tract infections were created by a Working Group of the International Society for Companion Animal Infectious Diseases. While objective data are currently limited, these guidelines provide information to assist in the diagnosis and management of upper and lower urinary tract infections in dogs and cats.

1. Introduction

Urinary tract disease is commonly encountered in dogs and cats and accounts for significant use (and presumably also overuse and misuse) of antimicrobials. Improper therapy can lead to a variety of patient health (e.g., failure to resolve infection), economic (e.g., need for repeated or prolonged treatment), public health (e.g., antimicrobial resistance) and regulatory (e.g., antimicrobial use) concerns.

In human medicine, antimicrobial use guidelines such as those developed by the Infectious Diseases Society of America (IDSA) are widely respected and provide excellent guidance to physicians on management of various infectious diseases, including urinary tract infections (UTIs) [1, 2]. Such guidelines can be directly used or form the basis of hospital-level antimicrobial use guidelines. The impact of national or international guidelines is difficult to assess, but implementation of antimicrobial use guidelines at the

Educational Programs

- “Get Smart”
- State sponsored – Health Departments
- Web-based training modules
- Client focused



“Get Smart” Program Centers for Disease Control and Prevention

The screenshot shows the CDC Get Smart website. The main heading is "Get Smart: Know When Antibiotics Work". Below this, there is a section titled "Antibiotics cure bacterial infections, not viral infections such as:" with a list of symptoms: Colds or flu; Most coughs and bronchitis; Sore throats not caused by strep; or; Runny noses. A "Learn more about antibiotic use >>" link is provided. To the right, there is a "Drug Resistance Strategy for Combating Antibiotic Resistance" section with a "Learn More >" link and a microscopic image of bacteria. Below the main heading, there are several sections: "Appropriate Antibiotic Use" with sub-sections for "Antibiotics Aren't Always the Answer", "Symptom Relief", "Antibiotic Resistance", and "Fast Facts"; "Campaign Materials" with a list of print, online, and radio/TV materials; "Info for Specific Groups" with sub-sections for "For Everyone", "Healthcare Professionals", "Program Planners", "Partners", "Media", "Spanish-Speakers", and "Antibióticos"; and a "Pharmacists Can Make the Difference" section. On the right side, there is a "CDC Microscape" section with a "CDC Commentary" and a "GET SMART FOR HEALTHCARE" logo. The website is displayed in a browser window with the address bar showing "www.cdc.gov/getsmart/community/index.html".



State Sponsored Programs

Stop Antibiotic Misuse in Minnesota
Minnesota Antibiotic Resistance Collaborative (MARC)

Antibiotic Facts

- Learn about antibiotics, preventing antibiotic-resistant infections, and appropriate use of antibiotics.
[What Are Antibiotics?](#) | [Prevent Antibiotic-Resistant Infections](#) | [Appropriate Use of Antibiotics](#)

Illnesses and Antibiotic Resistance

- Find out about viruses and bacteria, specific illnesses, and antibiotic-resistant diseases.
[Virus vs Bacteria](#) | [Will Antibiotics Help?](#) | [Staph Infections and MRSA](#)

Prevent Illness

- Stop the spread of germs if you are sick and how you can stay healthy.
[Stay Healthy](#) | [Cover Your Cough](#) | [Handwashing](#) | [Get Vaccinated](#)

Print Materials

- View, download, or order educational print materials.
[Posters](#) | [Flyers and brochures](#) | [Prescription pads](#) | [Other items](#) | [Cover Your Cough](#) | [Educational resource order form](#)

For Fun!

- [Online IQ Quiz](#) | [Science Museum Exhibit](#)

More information for...

- [Health Care Professionals](#)
- [Child Care Professionals](#)
- [Long Term Care Professionals](#)

Featured Materials:

- [Cough, Cold, and Flu](#)
- [Cough and Cold Care ER Shopping List](#)
- [Cover Your Cough](#)
- [Bacteria Blaster](#)
- [SAMM's Coloring Book](#)
- [Handwashing How To](#)
- [Prescription For Your Child's Viral Infection](#)



ANTIMICROBIAL RESISTANCE LEARNING SITE FOR VETERINARY STUDENTS



WELCOME

[Overview](#) | [Pharmacology](#) | [Microbiology](#) | [Public Health](#) | [Animated](#) | [Species Specific](#) | [Support](#)

[log in](#)

Overview

An introduction to the topic of antimicrobial resistance and the responsibility of veterinarians to keep antibiotics working for future generations of animals and people...[read more](#)



[Overview](#)



[Pharmacology](#)



[Microbiology](#)



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<http://amrls.cvm.msu.edu/>



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Clinical Modules

ANTIMICROBIAL RESISTANCE LEARNING SITE



PET ANIMALS

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you are here: [home](#) / [species specific](#) / [pet animals](#) / canine pyoderma teaching module

1. Antibiotics Use for Canine Pyoderma

Objectives:

1. Learn how antibiotics are frequently used in treatment of canine pyoderma, and what factors need to be considered when choosing antibiotic therapy.
2. Learn the underlying causes of canine pyoderma and possible diagnostic and treatment options.
3. Learn the importance of bacterial culture and susceptibility testing, and effective communication with the client.
4. Learn how animal and human health can both be affected by antibiotic resistance.

[1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [Next](#)



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Antimicrobial Therapy – “On Target”



General Considerations for Judicious Antimicrobial Use

- Consider and “rule-out” non-bacterial causes
- Consider other therapeutic options
- Utilize culture and sensitivity results
- Refer to published treatment guidelines
- Monitor treatment response and client compliance
- Take a “time out” before adding, switching, or changing antibiotic treatments



GASTROINTESTINAL DISEASE

- Avoid antimicrobials in healthy pets with diarrhea
- Provide supportive therapy
- Make a diagnosis before prescribing antimicrobials
- Fecal smears are not reliable for diagnosing enteropathogenic infections



RESPIRATORY DISEASE

- Avoid antimicrobials for acute, uncomplicated URT disease
- Perform additional diagnostics for complicated disease or chronic respiratory disease

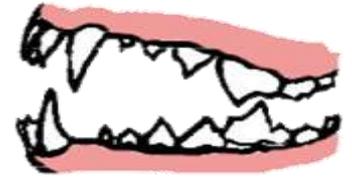


URINARY TRACT DISEASE

- Avoid diagnosis based on free-catch urine samples
- Do not routinely prescribe antimicrobials for a cat <10 years of age with lower urinary tract signs
- Confirm infections with quantitative cultures



DENTAL DISEASE



- Avoid antimicrobial use for routine dental procedures in healthy patients
- Choose antimicrobials with activity against known oral pathogens
- Antimicrobials are not a substitute for appropriate dental management



DERMATOLOGIC DISEASE

- Perform cytology of lesions in all cases of suspect pyoderma
- Perform microbial culture and sensitivity as well as additional diagnostics to investigate recurrent or refractory pyoderma
- Use topical shampoos or antimicrobials when possible



PERI-OPERATIVE USE



- Adhere to best practices for infection control in the operating room
- Avoid prophylactic antimicrobials for routine surgeries
- If prophylactic antimicrobials are used, administer them IV 30 – 60 minutes before surgery and do not administer them beyond the perioperative period



VECTOR-BORNE DISEASE



- Avoid antimicrobial therapy in animals that are seropositive for vector-borne pathogens; seropositivity does not imply active infection
- Recommend preventive treatments for ectoparasite control to prevent infection and spread of vector-borne pathogens



Others

- Canadian Veterinary Medical Association
CVMA Antimicrobial SmartVet
 - <http://www.canadianveterinarians.net/practice-economics/antimicrobial-smartvet>
- Clinic antibiogram App



VMC Antimicrobial Stewardship Team

- Hospital epidemiologist
- Clinical pharmacist
- Microbiologist
- Infection control practitioner
- Clinicians (Small animal, Large Animal)



Summary

- Antimicrobial resistance is a “Grand Challenge”
- Clinicians need to be aware and encourage good antimicrobial stewardship practices



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Questions?



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