Antimicrobial Drug Use In Companion Animals

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  - Control of Resistant Bacterial Infections and Promote AMD Stewardship

- Research Focus: Infectious Diseases and Antimicrobial Resistance
  - Food producing animals, especially cattle
  - Companion Animals

- American College of Veterinary Internal Medicine
  - Chair & Author: Consensus Statements on Antimicrobial Drug Use
Antimicrobial Drug Use in Companion Animals

1. What are your primary disease challenges that result in antibiotics being used for prevention, control, or treatment?

2. What are non-antibiotic control measures used for these disease challenges?

3. What antibiotic control measures are used for these diseases?
What are your primary disease challenges that result in antibiotics being used for prevention, control, or treatment?

- **Companion Animals** = Dogs, Cats, Horses (mainly)

- **Much** more likely to mimic AMD uses found in humans in comparison to food producing animals
  - Examples: Legal, but off-label use of drugs such as Carbapenems, Chloramphenicol, Linezolid, Tigecycline, Vancomycin, Quinupristin/Dalfopristin

- **People Are Much** more likely to have direct and indirect contact with companion animals in comparison to food producing animals
  - Food Safety Control Measures limit foodborne exposures
  - Rare physical exposure to food animals in modern society
  - Limited potential for indirect (environmental) exposures to food animals
"Do you think it's time Bossie started sleeping on the floor?"
1. What are disease challenges that result in antibiotics being used for prevention, control, or treatment?

- 2001 Mail Survey
- AVMA veterinarians randomly selected from throughout U.S. from 7 Self-declared practice categories
  - Large animal exclusive - LGANEXC
  - Large animal predominant - LGANPRED
  - Other private practice - OTHER
  - Mixed - MIXED
  - Equine exclusive - EQUINE
  - Small Animal predominant - SMANPRED
  - Small Animal exclusive - SMANEXC
- Response = 4,652 / 12,955 (35.4%)
Pick One Species: How Commonly Did You Treat With AMDs for Problems in These Body Systems During the Past Year?

<table>
<thead>
<tr>
<th>Average Rank</th>
<th>Bovine-Beef</th>
<th>Bovine-Dairy</th>
<th>Equine</th>
<th>Canine</th>
<th>Feline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank 1 (Most Common)</td>
<td>Respiratory Tract</td>
<td>Mammary Gland</td>
<td>Respiratory Tract</td>
<td>Integument/Skin</td>
<td>Urinary Tract</td>
</tr>
<tr>
<td>Rank 2</td>
<td>Digestive Tract</td>
<td>Respiratory Tract</td>
<td>Reproductive Tract</td>
<td>Ear and Eye</td>
<td>Respiratory Tract</td>
</tr>
<tr>
<td>Rank 3</td>
<td>Reproductive Tract</td>
<td>Reproductive Tract</td>
<td>Integument/Skin</td>
<td>Urinary Tract</td>
<td>Integument/Skin</td>
</tr>
<tr>
<td>Rank 4</td>
<td>Mammary Gland</td>
<td>Digestive Tract</td>
<td>Musculoskeletal System</td>
<td>Digestive Tract</td>
<td>Ear and Eye</td>
</tr>
<tr>
<td>Rank 5</td>
<td>Ear and Eye</td>
<td>Musculoskeletal System</td>
<td>Ear and Eye</td>
<td>Respiratory Tract</td>
<td>Digestive Tract</td>
</tr>
<tr>
<td>Rank 6</td>
<td>Musculoskeletal System</td>
<td>Urinary Tract</td>
<td>Digestive Tract</td>
<td>Musculoskeletal System</td>
<td>Musculoskeletal System</td>
</tr>
<tr>
<td>Rank 7</td>
<td>Urinary Tract</td>
<td>Ear and Eye</td>
<td>Neurological System</td>
<td>Reproductive Tract</td>
<td>Reproductive Tract</td>
</tr>
<tr>
<td>Rank 8</td>
<td>Neurological System</td>
<td>Integument/Skin</td>
<td>Urinary Tract</td>
<td>Mammary Gland</td>
<td>Mammary Gland</td>
</tr>
<tr>
<td>Rank 9 (Least Common)</td>
<td>Integument/Skin</td>
<td>Neurological System</td>
<td>Mammary Gland</td>
<td>Neurological System</td>
<td>Neurological System</td>
</tr>
</tbody>
</table>

Q4.2
2. What are non-antibiotic control measures used for these disease challenges?

- Limited...
- Respiratory vaccines – imperfect efficacy
- Novel Treatments for Atopy/Skin infections (ex.)
  - Monoclonal antibody that specifically targets and neutralizes interleukin-31 (IL-31)
    - CYTOPOINT™ - Zoetis
  - Vaccination with liposome-nucleic acid complexes
    - Immunostimulatory
- Urinary – nothing currently
- Reproductive tract – currently limited
3. What antibiotic control measures are used for these diseases?
Prophylaxis
Tx prior to potential exposure.
Metaphylaxis
Tx after potential exposure but prior to clinical disease.
Treatment
Tx of clinical disease.
Patients in Which Perceived AMR Affects Choice of Drugs

Q3.4
Summary of AMD Use in Hospitalized Patients
James L. Voss Veterinary Teaching Hospital
(1994-2007)

<table>
<thead>
<tr>
<th>Species</th>
<th>1Admissions</th>
<th>2Received AMD</th>
<th>3Percent AMD</th>
<th>4DDD&lt;sub&gt;SUM&lt;/sub&gt;</th>
<th>5DDD&lt;sub&gt;UD&lt;/sub&gt;</th>
<th>6DDD&lt;sub&gt;MED&lt;/sub&gt;</th>
<th>7DDDHoD&lt;sub&gt;MED&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equine</td>
<td>13,929</td>
<td>8,105</td>
<td>58.2%</td>
<td>184,675</td>
<td>243</td>
<td>1.27</td>
<td>0.14</td>
</tr>
<tr>
<td>Canine</td>
<td>44,603</td>
<td>24,329</td>
<td>54.5%</td>
<td>324,636</td>
<td>428</td>
<td>2.36</td>
<td>0.47</td>
</tr>
<tr>
<td>Feline</td>
<td>12,245</td>
<td>3,868</td>
<td>31.6%</td>
<td>39,946</td>
<td>53</td>
<td>3.29</td>
<td>1.10</td>
</tr>
</tbody>
</table>

*1. Number of patients admitted to the hospital for at least one day.
2. Number of patients that received at least one antimicrobial drug (AMD) and were hospitalized at least one day.
*3. Percent of hospitalized patients that received at least one AMD.
4. The sum of the Defined Daily Dose for patients receiving antimicrobials and hospitalized at least one day.
*5. Usage Density: Defined Daily Dose per 100 total patients hospitalized for at least one day.
*6. Median Defined Daily Dose for patients receiving antimicrobials and hospitalized for at least one day.
7. Defined Daily Dose per Hospitalized Day for patients receiving antimicrobials and hospitalized for at least one day.
DDD Prescribed, by Drug Class
JLV-VTH Inpatients (1994-2007)

Total of 538,402 DDDs prescribed 1994-2004

- Aminoglycoside
- Cephalosporin
- Fluoroquinolone
- Lincosamide
- Macrolide
- Metronidazole
- Penicillin
- Potentiated Penicillin
- Phenicol
- Sulfonamide
- Tetracycline
- Other
Inpatients Receiving AMD Prescriptions, by Species and Drug Class (1994-2007)

- **Canine** (n=24,329)
  - 50.1% cephalosporin (n=12,194)
  - 8.6% potentiated penicillin (n=2,095)
  - 4.5% cephalosporin/potentiated penicillin (n=1,090)

- **Feline** (n=3,868)
  - 30.6% potentiated penicillin (n=1,185)
  - 26.7% cephalosporin (n=1,032)
  - 9.6% cephalosporin/potentiated penicillin (n=371)

- **Equine** (n=8,105)
  - 17.4% aminoglycoside/penicillin (n=1,413)
  - 11.3% penicillin (n=917)
  - 11.3% sulfonamide (n=679)
  - 7.6% aminoglycoside/penicillin/sulfonamide (n=619)
Treatment Guidelines & Consensus Statements

2005
Antimicrobial Drug Use in Veterinary Medicine
Paul S. Morley, Michael D. Apley, Thomas E. Besser, Derek P. Burney, Paula J. Fedorka-Cray, Mark G. Papich, Josie L. Trabú-Dargatz, and J. Scott Weese

2015
ACVIM Consensus Statement on Therapeutic Antimicrobial Use in Animals and Antimicrobial Resistance

ISCAID
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)
Andrew Hillier*, David H. Lloyd†, J. Scott Weese‡, Joseph M. Blondeau§, Dawn Booth¶, Edward Breitschwerdt***, Luca Guardabassi††, Mark G. Papich**, Shelley Rankin‡‡, John D. Turnidge§§ and Jane E. Sykes¶¶

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
I. Scott Weese, Joseph M. Blondeau, Dawn Boothe, Edward B. Breitschwerdt, Luca Guardobassi, Andrew Hillier, David H. Lloyd, Mark G. Papich, Shelley C. Rankin, John D. Turnidge, and Jane E. Sykes
Veterinarians’ Attitudes Regarding Sources of AMR
In your opinion, how important are these aspects of AMD use in humans as contributors to development of antimicrobial drug resistance (in animals or humans)?

Q2.2
**In your opinion**, how important are these aspects of AMD use in animals as contributors to development of antimicrobial drug resistance (in animals or humans)?

![Bar chart showing the percent of responses for different aspects of AMD use in animals, including Companion Animals, Horses, Food Animals, OTC Drug Use, Vet Prescribing, and Client Compliance. The chart uses colors to represent the level of importance: Not Important (light blue), Somewhat Important (yellow), Important (dark red), Very Important (dark blue).]
Do Your Antimicrobial Use Practices as a Veterinarian Lead to the Development of Antimicrobial Resistance in Bacteria?
Veterinarians Said:

- **Use in humans** (physician prescribing, etc) was considered most harmful.
- **Use by other veterinarians** was also believed to promote AMR:
  - Most in Food Animals
  - Least in Companion Animals
- **My own use** rarely/never promotes AMR.
Thank You

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