

Practicing Sustainable Antibiotic Use in Cats

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 Cornell University



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**Learning Objectives**

1. Apply the principles of antimicrobial stewardship to antimicrobial use decisions in cats
2. Discuss sustainable antimicrobial use with cat owners, including the importance of diagnostic tests and antimicrobial selection
3. Identify common and problematic resistance phenotypes in feline pathogens

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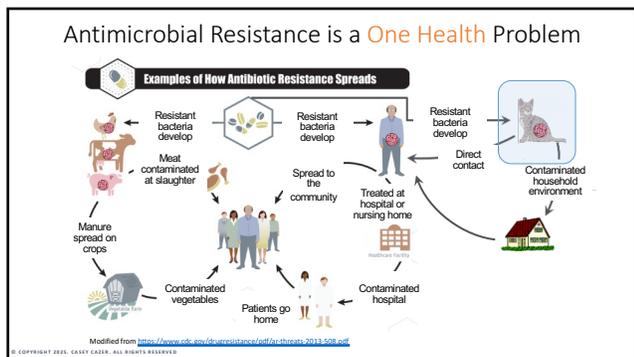
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## Antimicrobial Stewardship Definitions

### Infectious Disease Society of America:

Antimicrobial stewardship refers to **coordinated interventions** designed to **improve** and measure the **appropriate use of antimicrobials** by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration.

Antimicrobial stewards seek to **achieve optimal clinical outcomes** related to antimicrobial use, minimize toxicity and other adverse events, reduce the costs of health care for infections, and **limit the selection for antimicrobial resistant strains**.

### AVMA:

Antimicrobial stewardship refers to 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.

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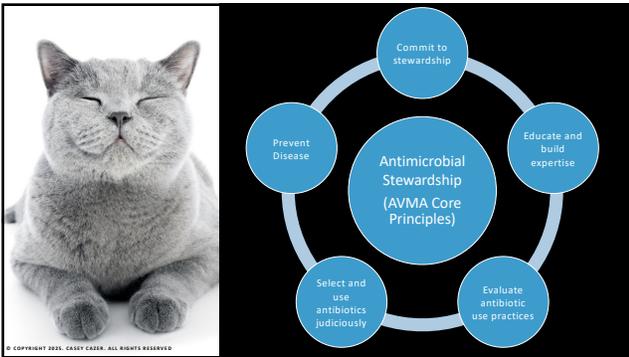
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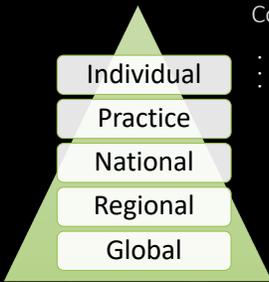
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## Commitment to Stewardship



- Be an antimicrobial stewardship champion
- Make a public commitment to clients
- Define your personal or hospital stewardship priorities



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AVMA Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings

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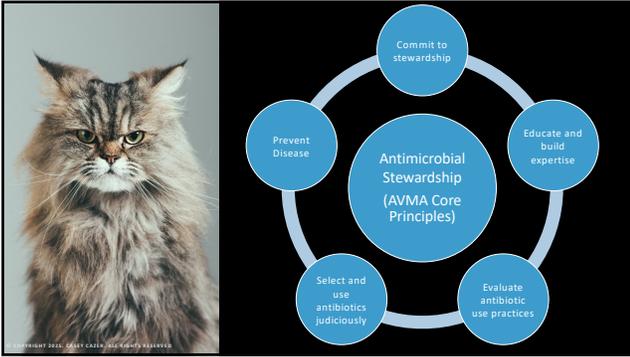
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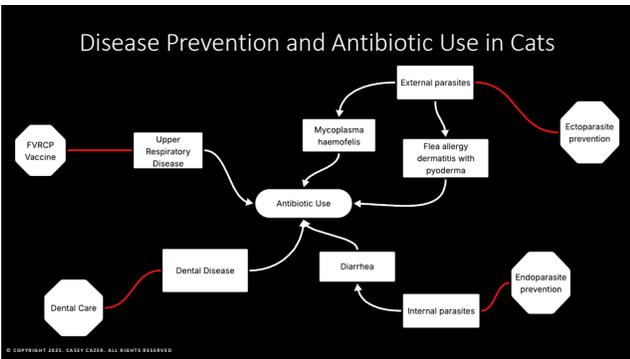
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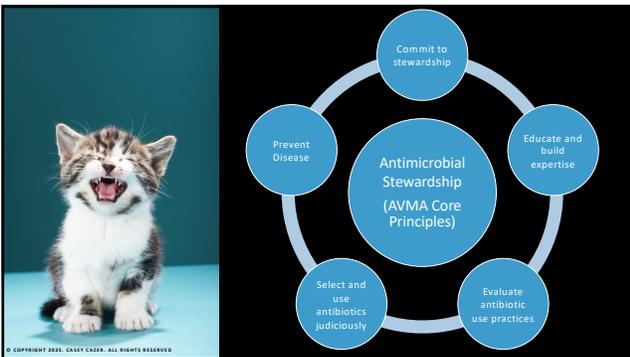
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### Judicious Antimicrobial Use – 5 “Rights”

- Right Patient: Does this animal need an antimicrobial?**
  - A diagnosis or condition that supports antimicrobial use
  - Rule out conditions that do not respond to antimicrobials (e.g., FLUTD, pancreatitis, viral infections, acute diarrhea)
- Right Drug: What antimicrobial should I use?**
  - Culture and susceptibility testing should be performed if possible
  - Use narrowest spectrum antimicrobial possible
  - Use topical antimicrobials when possible
  - Avoid antimicrobials essential to human medicine
- Right Dose, Right Time, and Right Duration**
  - Use regimens supported with scientific evidence or principles (pharmacokinetics-pharmacodynamics)
  - Use regimens that are used for breakpoint development
  - To minimize antimicrobial resistance, treat for the shortest duration that will be effective – but what is that?
- Review and use antimicrobial use guidelines**
  - ISCAID, AAEP, BSAVA, OSU, Firstline OVC, AVMA



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### Antimicrobial Susceptibility Testing

Tetracycline Concentration				Reported MIC	MIC Interval	Interpretation
S	I	R				
4	8	16	32			
				≤ 4	(0,4]	Susceptible

 Growth   
  No Growth   
  Not Assessed

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### Breakpoint Definitions

- Susceptible:** isolates with an MIC in this category are inhibited by usually achievable concentrations of antimicrobial agent when the dosage recommended to treat the site of infection is used, resulting in likely clinical efficacy
- Susceptible dose-dependent:** susceptibility of isolates with an MIC in this category is dependent on dosing regimen that is used. It is necessary to use a dosing regimen that results in higher drug exposure than the regimen used to establish the susceptible breakpoint (e.g., higher doses, more frequent, or both)
- Intermediate:** isolates with an MIC in this category approach usually achievable concentrations of antimicrobial agent and/or for which response rates may be lower than susceptible isolates
- Resistant:** isolates with an MIC in this category are NOT inhibited by usually achievable concentrations of antimicrobial agent with normal dosage schedules and/or specific microbial resistance mechanisms are likely and clinical efficacy of agent has not been reliably shown in isolates with similar phenotypes

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### Poor Adherence to AMU Guidelines

For feline UTIs, only 54% of amoxicillin prescriptions and 69% of amoxicillin-clavulanate prescriptions were the recommended dosage

For feline URIs, only 34% of doxycycline prescriptions had the recommended dosage and only 47% had the recommended duration.

Less than 25% were for the recommended duration (treated for too long)

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VET Report, 2018

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### Overuse of Convenia in Cats?

- Extended-spectrum beta-lactam (ESBL) resistance is a significant problem in humans
- Use of third-generation cephalosporins, and other beta-lactams, can select for ESBL resistance
- Cefovecin (Convenia), an injectable third generation cephalosporin, is the most common antibiotic used in cats



43% of all antibiotics given to cats in Banfield practices in 2023

31% of respiratory tract infections that received antibiotics, although stewardship guidelines recommend oral doxycycline or amoxicillin-clavulanic acid

44% of urinary tract infections that received antibiotics, although stewardship guidelines recommend oral amoxicillin or TMS

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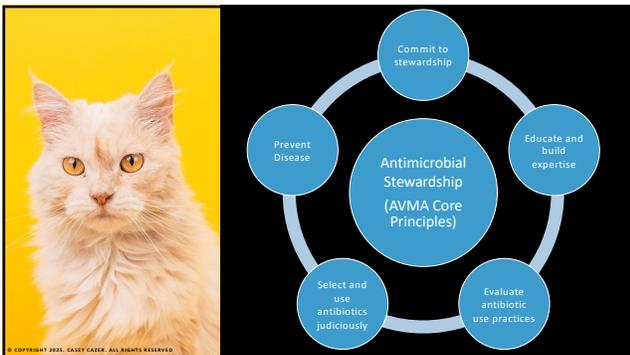
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### Antimicrobial Use and Stewardship Resources

- [AVMA Checklist for Antimicrobial Stewardship](#)
- [BSAVA PROTECT IM3 Poster](#)
- [IUM Handbook of Antimicrobial Stewardship in Companion Animal Veterinary Settings](#)
- [AVMA Antimicrobial Stewardship Definitions and Core Principles](#)
- [AVMA Judicious Therapeutic Use of Antimicrobials](#)
- [ACVIM Consensus Statement on Therapeutic Antimicrobial Use in Animals and Antimicrobial Resistance](#)
- [AAEP/AAHA 2022 Antimicrobial Stewardship Guidelines](#)
- [AVMA Does this cat need antibiotics?](#)
- World Small Animal Veterinary Association
  - [Global Repository of AMU Guidelines](#)
  - [Therapeutic Guidelines Group](#)
- European Medicines Agency
  - [Categorization of antibiotics for use in animals for prudent and responsible use](#)
  - [Resources on AMR and AMU in veterinary medicine](#)
- International Society for Companion Animal Infectious Diseases (ISCAID)
  - [Respiratory Tract Infections](#)
  - [Pododermia](#)
  - [Urinary Tract Infections](#)
- [European Network for Optimization of Veterinary Antimicrobial Treatment \(ENO VAT\)](#)

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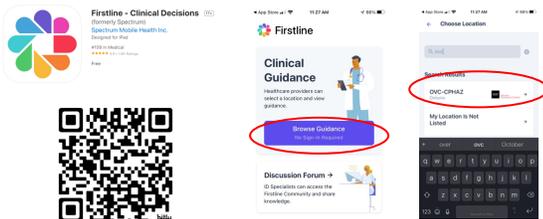
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### Small Animal Antimicrobial Prescribing Guidelines



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### Learning Objectives

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## How can veterinarians and cat owners work together on antimicrobial stewardship?

**Question 1:** How do **cat owners** describe their success with giving oral medications? What factors impact their medication preferences and behavior?

**Question 2:** What influences do **veterinarians** note in their prescribing practices, particularly around Convenia? How concerned are they about AMR?

**Question 3:** What **gaps** exist between veterinarians and cat owners that might be amenable to interventions that promote AMR stewardship (i.e., reducing veterinarians' prescribing of Convenia when not indicated)?

**Study design: Mixed Quantitative and Qualitative Methods**

1. Qualtrics survey (n=600) with convenience sample of US cat owners
2. Interviews (n= 21) with NY State Veterinarians



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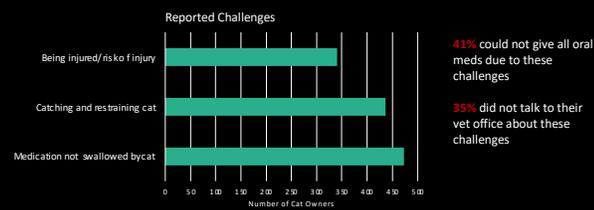
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## Many Cat Owners Find Giving Cats Oral Antibiotics Difficult



Cazzer CL, Lashinski JW, Frye A, Gonzalez L, Gruber SFA. 2022. Divergent Veterinarian and Cat Owner Perspectives are a Barrier to Reducing the Use of Convenia in Cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487  
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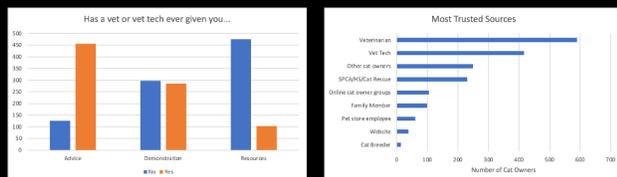
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## An Opportunity to Help Cats and Cat Owners



- Common Advice Received:**
- Give with food
  - Improve cat restraint (towels, etc)

Cazzer CL, Frye A, Lashinski JW, Gonzalez L, Coker Angel C, Gruber SFA. Pathways to sustainable antimicrobial use in cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0485  
Cazzer CL, Lashinski JW, Frye A, Gonzalez L, Gruber SFA. 2022. Divergent Veterinarian and Cat Owner Perspectives are a Barrier to Reducing the Use of Convenia in Cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487

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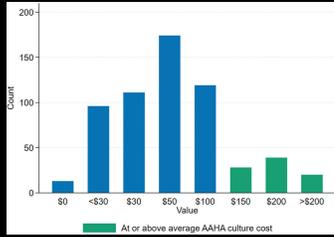
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### Amount Cat Owners Are Willing to Pay for Diagnostic Testing to Guide Antimicrobial Selection



Casey CL, Frye A, Lawless JM, Gonzalez L, Cohen Anzil C, Gruber Salt A. Pathways to sustainable antimicrobial use in cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487

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### Inappropriate AMU from Veterinarian Interviews

Unaware of own inappropriate AMU

"I've got a cat who probably has recurrent herpes and [the owner] just called the front desk and asked if she could get a refill of Zeniquin [meropenem] because that usually calms her cat's signs down ... This case I did give it to her" (Veterinarian #6).

"I am still in the camp of using antimicrobials for stress cystitis ... if I cultured it, I'd often get a negative culture, which many would argue, 'well, you shouldn't treat them with an antibiotic.' But, I find that if I treat my stress cystitis with antimicrobials, they do a lot better in the long run" (Veterinarian #8).

"We use it [ceftiofuran] with our dentals all the time because it's just really easy to administer. ... So I would say for cats, it's probably our number one antibiotic chosen" (Veterinarian #7).

"Especially when you have a patient with feline lower urinary tract disease and they constantly have an issue, I feel like I love giving it [ceftiofuran], then 14 days later boosting it ... They normally do surprisingly well" (Veterinarian #7).

Casey CL, Lawless JM, Frye A, Gonzalez L, Gruber Salt A. 2023. Divergent veterinarian and Cat Owner Perspectives on a Barrier to Reducing the Use of Ceftriaxone in Cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487

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### Inappropriate AMU from Veterinarian Interviews

Aware of other's inappropriate AMU

"We have a few colleagues that do prescribe antibiotics for cats post-surgery for routine surgeries like spays and neuters" (Veterinarian #12).

"I think in the shelter it's more pressure from other veterinarians, for example, with upper respiratory infections. Even if something is mild like just a little bit of ocular nasal discharge that's serous, with no mucopurulent discharge, some vets will want to start antibiotics right away to be proactive and prevent breakouts within the shelter" (Veterinarian #3).

"As I mentioned before, some cats with upper respiratory infections get Convenia injections from my colleagues, even though that's not the spectrum that it needs" (Veterinarian #3).

Casey CL, Lawless JM, Frye A, Gonzalez L, Gruber Salt A. 2023. Divergent veterinarian and Cat Owner Perspectives on a Barrier to Reducing the Use of Ceftriaxone in Cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487

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### Perceived Benefits of Cefovecin

Easy for owners, guarantees cat receives meds	<p><b>"It's convenient, it's easy.</b> The clients don't have to do anything...<b>we probably use it far too much"</b> #12</p> <p><b>"It's really the compliance. So, it's all about the convenience for me.</b> If someone really thinks that they're not going to be able to medicate their cat, or if it's a cat that's not handleable or touchable, then <b>we know that we're getting full antibiotic compliance</b> for the duration that we want." #3</p>
Best for some types of owners	<p><b>"A lot of older people live by themselves,</b> those in their late seventies, eighties. <b>They don't have assistance.</b> Maybe they're <b>not as physically able to wrap their cat up</b> in a towel and hold the cat while holding the pill and opening the cat's mouth [so I prescribe Convenia]." #9</p> <p><b>"[If] the [owners are] leaving on Friday for a two-week vacation. As poor of a reason it may be, I'd rather have the cat get treated than get on my soapbox</b> and say, 'No, we shouldn't do this.'" #16</p>
Best for some types of cats	<p><b>"I probably jumped on [cefovecin use] right away because of all the feral work</b> that we do. <b>We've only got one shot literally to treat them."</b> #21</p>
Vets assume owners can't pill cat by default	<p><b>"I generally don't ask owners to try to put a pill down the cat's mouth,</b> unless they volunteer that it's easy for them to do and they've done it before" #5</p>

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### Concerns about Cefovecin

Adverse Reactions	<p><b>"We can't take it back,</b> so if it causes any GI upset, <b>if there are any reactions to it, then there's not a whole lot that we can do."</b> (Veterinarian #3).</p>
AMR	<p><b>"I think it's an antibiotic that is used very frequently, and so I do, I guess, wonder whether, at some point, we will create resistance to it"</b> (Veterinarian #1).</p>
"Big gun" antibiotic	<p><b>"It makes me a little uncomfortable that it may be a more advanced antibiotic than is necessary. I just reach for it because it's the only one that's available in that format [long acting injectable]"</b> (Veterinarian #10).</p>

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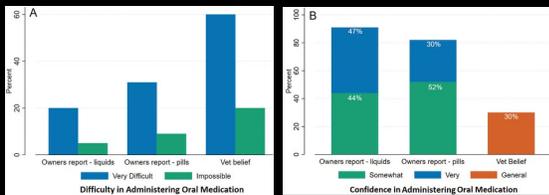
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### Divergent Veterinarian and Cat Owner Perspectives

Might this (mis)perception impact willingness to prescribe cefovecin?



Cover GJ, Lueders JW, Papp A, Gonzalez J, Givner SA. 2023. Divergent Veterinarian and Cat Owner Perspectives are a Barrier to Reducing the Use of Cefovecin in Cats. J Am Vet Med Assoc. doi: 10.2460/javma.23.08.0487

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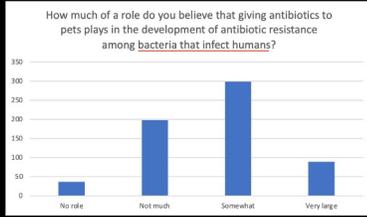
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### Cat Owner Perceptions of Antimicrobial Resistance



81% said their vet has **NOT** discussed antimicrobial resistance with them

If vets are **not** discussing resistance, do cat owners understand:

- The role of diagnostic testing?
- The importance of appropriate antibiotic selection?

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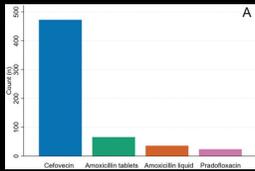
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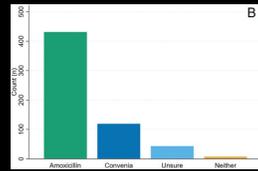
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### Providing Information on Antibiotic Resistance May Change Cat Owners' Antibiotic Preferences

Q 12. If your cat has a UTI and you had the following medication options...



Q 13. Convenia is more likely to cause problematic antimicrobial resistance than amoxicillin...




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### Guidance – Modeling Behavior, Influencing Norms

Standing up to /Refusing Client Request	<p>"the more years in practice I am, the less I am influenced by what they really, really want. I used to ... think, 'Oh my god, they came in, they paid for an exam, and I'm not sending them home without any treatment at all ... they're gonna be very upset by that,' but <b>I don't leave to that anymore</b>" (Veterinarian #15).</p> <p>"I'm pretty strict with [giving antibiotics without seeing the cat] <b>despite the fact that clients get really upset about it, but I don't care</b> ... They have to bring them in" (Veterinarian #17).</p> <p>"Sometimes I will get owner pushback of, 'well, the last time Dr. So-and-so prescribed this antibiotic and it seemed to help. So I wanna do that again'... <b>I don't know that I've ever let an owner talk me into using an antibiotic when I didn't want to.</b>" (Veterinarian #19).</p>
Offering Alternatives	<p>"I try to give them something else like <b>not noxious to do</b>... like FortiFlora or a supplement, like lysine... <b>"I'm kind of treating the people more than the cat sometimes"</b> (Veterinarian #3).</p>
Focus on AMR	<p>"we always say, 'Okay, well <b>we need to do diagnostics first before you can potentially have your antibiotics</b>. Some people are a little resistant to that. And usually, my next kind of talking point is, 'well, we need to check, because <b>if we just give antibiotics for every accident in the house, we could be contributing to antimicrobial resistance.</b>" (Veterinarian #11).</p>

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### Learning Objectives

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## Antimicrobial Resistance in Pets is a Growing Problem

### Pets Are Passing Drug-Resistant 'Superbugs' to Their Owners

By HealthDay | April 15, 2024

#### US veterinary hospital faces rare antibiotic-resistant E coli

Chris Dall | News Reporter | CIDRAP News, January 10, 2020

#### E. coli variant may cause antimicrobial resistance in dogs, humans

By Krishna Ramaniyag, Cornell Chronicle | July 16, 2024

**UF Emerging Pathogens Institute**  
UNIVERSITY OF FLORIDA

**Yes, humans can get their pets sick: reverse zoonoses more common than once thought**

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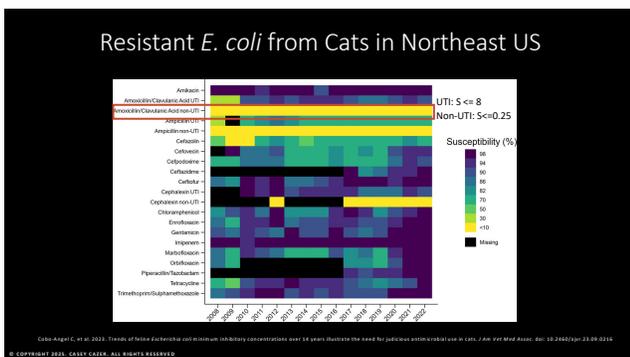
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### Resistant Staphylococci from Cats in Northeast US

Antimicrobial	Staphylococcus			Overall (n=1237)
	Staphylococcus aureus (n=268)	Staphylococcus felis (n=325)	pseudintermedius (n=184)	
Amikacin	74%	100%	97%	91%
Amoxicillin-clavulanic acid (non-UTI)	42%	99%	63%	70%
Ampicillin (non-UTI)	29%	87%	23%	49%
Cefazolin	79%	100%	67%	82%
Cefovecin	78%	100%	67%	81%
Clindamycin	94%	93%	50%	81%
Doxycycline	75%	97%	51%	75%
Enrofloxacin	74%	98%	64%	80%
Oxacillin + 2% NaCl	81%	100%	67%	82%
Penicillin	29%	86%	23%	48%
Pradofloxacin	88%	100%	62%	84%
Tetracycline	83%	94%	48%	72%
Trimethoprim-Sulfamethoxazole	100%	100%	77%	95%

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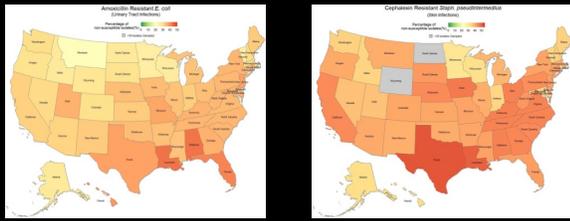
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### National Trends in Resistance – First-line Drugs



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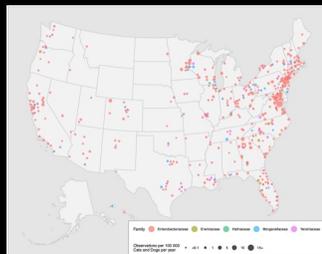
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### National Trends in Resistance – Last-resort Drugs Carbapenem-resistant Enterobacteriales



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What questions  
do you have?

Contact information:

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[casey.cazer@cornell.edu](mailto:casey.cazer@cornell.edu)



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