ANTIBIOTIC MYTH-BUSTING

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(SCARY) KEY CONCEPTS

Systemic antimicrobial therapy **exposes pathogens AND commensal bacteria** from the entire body to the antimicrobial.

- This means we're **selecting for resistant bacterial strains** in ALL the bacterial populations in the body.

The real problem arises when a benign bacteria pass on the **resistance genes** to pathogen (**Plasmids** are mobile genetic elements that carry different resistance genes to different antimicrobials from one bacterium to another).

"The key message with anti-microbial stewardship is that it's not about being a perfect prescriber. It's just about making incremental changes to make better antimicrobial prescribing decisions."

DEBUNKING ANTIBIOTIC MYTHS

MYTH: Our drugs will wipe out the infection.

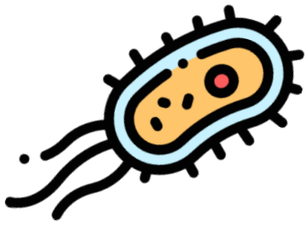
FACT: When using antimicrobials, the goal is NOT to wipe out all bacteria, but rather to tilt the balance in favour of the animal's immune system against the bacteria.

MYTH: You need to finish the course of antibiotics to avoid antimicrobial resistance.

FACT: Traditional courses of antimicrobials have been determined in a very arbitrary way. Remember, the goal of antimicrobial therapy is not to wipe out all bacteria.

MYTH: We need long courses of antibiotics until all the bugs are gone.

FACT: Clinical trials found that shorter treatment courses work just as well, while reducing the chance of adverse effects and the development of anti-microbial resistance. *(See guidelines and resources at the end of the notes)*



MYTH: If you see bacteria in urine you need to start an antibiotic.

FACT: Recent guidelines suggest that unless the bacteria are causing any symptoms, you don't necessarily treat them with antimicrobials.

NOTE: Remember there will still be variability in different cases since some animals have less competent immune systems.

DEBUNKING ANTIBIOTIC MYTHS (CONT.)

MYTH: Broad-spectrum antibiotics are stronger and are better than 'weaker' antibiotics.

FACT: No, it does not work that way. It's either sensitive, or it's not. Antibiotics affect a certain type of bacteria so let go of the mindset that using the newer and/or stronger antibiotics are somehow better. The best choice is the lowest importance antibiotic that will work on the target pathogen.

Our aim is to use narrow-spectrum, low-importance antibiotics for a shorter duration.

WHAT TO AVOID

Under-dosing and **wrong frequency of dosing** contribute to antimicrobial resistance.

Focus on avoiding the **MUTANT SELECTION WINDOW**: the antibiotic concentration that is **enough to select for mutants** with resistance genes, **but not enough to actually kill them**.

- The longer bacteria are exposed to that antibiotic concentration, the more resistance is likely to develop.
- Consistently under-dosing also tends to keep the animal in the mutant selection window.

DOSAGE GUIDELINES

Dosage guidelines on the drug bottles are **not always going to be correct**.

- It is still best to look up a different reference other than what's written on the bottle.

Independent prescribing guidelines are available containing recommended drug dose rates and frequencies based on evidence for the most common conditions. *(See resources below)*

AMOXICILLIN VS. AMOXICLAV

The clavulanate in amoxiclav is helpful if the pathogens you are targeting produce **beta-lactamase**.

- Data collected in dogs from ASAP Laboratory in Victoria show that only **6% of the isolates in non-urine samples**, and **11% of the isolates in urine samples** could have benefited from the addition of clavulanate to amoxicillin; but many of these beta-lactamase producing isolates could alternatively have been treated with a low importance antibiotic of a different class (*e.g.* doxycycline).
- Data from dogs and cats with UTIs suggest that **94% of the infections can be treated with an antibiotic of low importance** such as amoxicillin or TMS.

Amoxiclav is classified as an antibiotic of medium importance due to the added clavulanate, and ideally should be used **only when there is no low-importance antibiotic that would be suitable**.

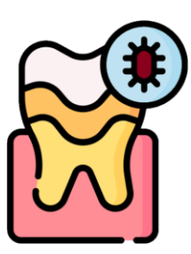
PRO-TIP: Discuss your approach with your clients. Many clients are also becoming **more aware of AMR** and are open to a less aggressive approach with antibiotics.

INAPPROPRIATE USES OF ANTIBIOTICS

CAT-FIGHT ABSCESS

If you **opened** and **flushed** the abscess, and the owner can keep it draining, the **nidus of infection** is gone. Unless there are additional complications (*e.g.* cellulitis), antibiotics are not needed.

DENTAL DISEASE



Pre-dosing antibiotics before a dental is not necessary, and in almost all cases, antibiotics are **actually not required** at all.

INAPPROPRIATE USES OF ANTIBIOTICS (CONT.)

CEFOVECIN INJECTIONS

Using cefovecin (third-generation cephalosporin) is much riskier than a 5-day course of amoxiclav because:

- It lasts for 14 days, exposing commensal flora to selection pressure for longer than necessary for most infections
- It selects for extended-spectrum beta-lactamase-producing bacteria (ESBLs) - some of the more frightening multi-drug resistant organisms

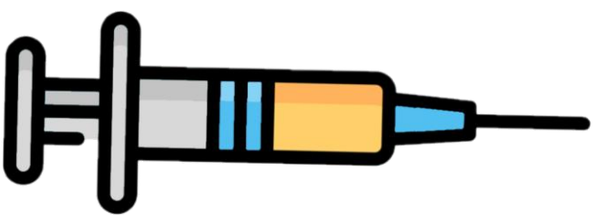
NOTE: ESBLs can break down most cephalosporins and penicillins, leaving few or no treatment options. This is why 3rd and 4th generation cephalosporins are classified as high importance and should be used only when really needed.

BREAKING BAD HABITS: ALTERNATIVE CHOICES

LONG-ACTING INJECTABLE AMOXICILLIN

Consider using this if giving tablets to cats is difficult. **Lasts for 48 hours** - recheck in 48 hours for injection. It can be an option to treat common conditions (*e.g.* UTIs especially caused by **cocci**).

- Long-acting amoxicillin injections will give you **very high drug concentrations in the urine**.



TRIMETHOPRIM SULFONAMIDE

A really good choice for UTIs especially those caused by **rods**, if given for only a **short duration**.

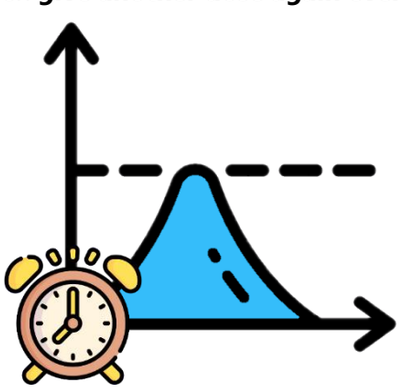
- People tend to get scared of causing **KCS and hepatopathies** from the sulfonamide component, but these have only been reported with **LONGER COURSES** than the UTI courses recommended in the guidelines.
- A short course of 3 days TMS is more manageable for owners and will minimise risk of adverse effects
- Remember that cats should only have unbroken, coated TMS tablets to avoid hypersalivation. Cat owners should always be instructed on good tableting technique.

"It also makes it a lot easier for owners who don't enjoy tableting their cats or have trouble remembering if they only have to remember for three days or struggle with their cat for three days, that's a lot more doable than 7 or 10 days, right?"

SURGICAL ANTIBIOTICS

The **timing** of giving the antibiotic is really important for surgeries. Once the **peak plasma levels** of the antibiotic have been reached, that is the time you make your cut.

- Ideally, give the antibiotic about **30 to 60 minutes prior to your cut** (giving it at the time of the cut is too late!). And then **give another dose again every 4 hours** if the procedure is quite long.



RECOMMENDED RESOURCES

DOSAGE, DURATION & ANTIBIOTIC CHOICES GUIDELINES
https://vetantibiotics.fvas.unimelb.edu.au/about/resources/

UNIVERSITY OF MELBOURNE FLIPBOOK
https://agriculture.vic.gov.au/__data/assets/pdf_file/0010/605764/AGVIC_A5_SmallAnimals_Flipbook.pdf

AMR VET COLLECTIVE
https://www.amrvetcollective.com/

VET COMPASS
https://www.vetcompass.org/

RIATI'S NOTES WITH LINKS TO ALL THE EVIDENCE
(FOR THE SKEPTICS AMONG US)

'SHORTER IS BETTER'

Infectious diseases experts have more or less dumped the old mantra, "finish the course" in favour of 'shorter is better' (within reason, of course). Historically, antimicrobial courses for humans and animals were determined fairly arbitrarily, and trials to determine the *minimum* duration of therapy were almost never performed. Now, many such trials have been done in humans (and some in animals) and shorter durations are almost universally found to be as effective as traditional courses, with fewer adverse effects and lower risk of antimicrobial resistance. This new evidence is reflected in the shorter durations recommended in recent veterinary guidelines. Resolution of clinical signs and/or biomarkers may also be useful guides for ceasing antimicrobial therapy, although evidence for this in veterinary medicine is currently scant.

DOSE RATES & FREQUENCY: YOU CAN'T ALWAYS TRUST THE LABEL

Australian vets are commonly under-dosing antimicrobials and the dose rate on the label is not always supported by current evidence. Refer to the pocket guides available for dogs/cats and horses for evidence-based antimicrobial dose rates or to other up-to-date, evidence-based sources.

UTIs

A large-scale study of Australian dog and cat urinary isolates showed very high susceptibility to the low-importance antimicrobials amoxicillin and trimethoprim-sulfonamide (TMS), as recommended in the international and Australian guidelines. (In-clinic microscopy also helps - for cocci, amoxicillin is a better choice, for rods, TMS is a better choice). There was rarely a need for amoxyclav (4% of isolates), very rarely a need for enrofloxacin (0.7% of isolates) and never any microbiological justification for cefovecin (0%). If oral medications are not feasible, consider a series of long-acting amoxicillin injections, q48h.

SUBCLINICAL BACTERIURIA

Bacteria in the bladder do NOT need to be treated if there are no clinical signs of infection. Open-access International guidelines on subclinical bacteriuria include the supporting evidence. Additional info can be found in this review article.

CAT FIGHT ABSCESSES

Studies on cat fight abscesses are unfortunately lacking, but first principles suggest that removing the pus is the key treatment. In other species (horses, cattle) cutaneous abscesses are routinely treated with drainage alone. (Instructing the cat owner to keep the abscess wound open and flush saline through the cavity for a few days is likely to reduce the likelihood of an abscess re-forming.)

Current veterinary guidelines are based on first principles and several studies in humans showed no advantage in adding antimicrobials once an abscess has been opened, flushed and drainage established.

We note that more recent studies included in a small (4 studies) meta-analysis of human abscess management suggested a modest reduction in treatment failure rate when systemic antimicrobials were given after draining an abscess. However, this benefit may be limited to human populations with high prevalence of methicillin-resistant Staph. aureus (MRSA). The adverse effects of

giving systemic antimicrobials for the majority of cases that do not need them, must also be considered.

Our own research on cat fight abscess management in Australia (not yet published) shows almost all cats with abscesses are still being given systemic antimicrobials, however in the small group that received no antimicrobials, there did *not* appear to be a higher rate of treatment failure. More evidence is needed to make a determination.

For now, the recommendation for cat fight abscesses remains as per the 2019 guidelines, namely NO antimicrobials unless systemically unwell, diffuse tissue involvement, joint involvement, or immunosuppressed. In those cases, give amoxicillin for 5-10 days. Again, if oral antimicrobials are not feasible, consider long-acting amoxicillin injections, q48h.

SURGICAL ANTIMICROBIAL PROPHYLAXIS

Current guidelines for dogs and cats state that no antimicrobial prophylaxis is needed for clean surgeries (e.g. desexing, ex lap where no viscus is opened). For clean-contaminated surgeries, give antimicrobials amoxicillin or cefazolin WELL before the surgery, so tissue levels are high when you make the first incision. Subcut doses should be given 2h prior, IV and IM doses 30-60 min prior to incision. A summary of the evidence on this topic is available on the UniMelb Vet Antibiotics website.