VET2VET

INSIGHTS INFOSHEET

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TOPIC 1 – Antimicrobial Stewardship

KEY STEPS

- Antimicrobial resistance (AMR) is a growing threat to modern human and veterinary healthcare.
- This one-health problem requires concerted effort by us all.
- We must **replace, reduce** and **refine** our antibiotic use.

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Dr Tim Nuttall is the Head of Dermatology at the Dick Vet School and is a globally recognized veterinary specialist in dermatology, canine atopic dermatitis and antimicrobial resistance.

Tim has written over 100 clinical / scientific publications and has served on RCVS, BSAVA, ESVD and DEFRA scientific committees as well as the Controlling Antimicrobial Resistance in Scotland (CARS) Steering Group. His current research programme is studying antimicrobial resistance and skin infections. In 2014 he received the BSAVA Woodrow Award for outstanding contributions to veterinary medicine.

Improving antimicrobial stewardship – The 3 R's

REPLACE	REDUCE	REFINE
Use alternatives to antibiotics	Reduce antibiotic prescribing – audit & benchmark use	Diagnose bacterial infections
Practice preventative care	Reduce owner expectations for antibiotic treatment	Use the right drug for the right bug
Treat the underlying disease		Use 1st tier & narrow-spectrum antibiotics
Use symptomatic treatment - let the immune system tackle the infection		Justify use of 2nd /3rd tier & broad-spectrum antibiotics
Use antiseptics		Treat to clinical cure – avoid over-treating

Key steps in antimicrobial stewardship

1	• Confirm a bacterial infection • Avoid 'just in case' treatment • Avoid use of antibiotics when unlikely to impact outcomes e.g. vomiting, diarrhea, etc
2	• Does the infection need systemic antibiotics? • Think about alternatives
3	• For systemic treatment always use the lowest tier & most narrow spectrum drug • Don't use broad-spectrum drugs by default
4	• Treat to clinical cure • Avoid overly long courses of antibiotics
5	• Animals with recurrent infections do not have antibiotic deficiencies • Diagnose and manage the underlying condition

Diagnosis of bacterial infections

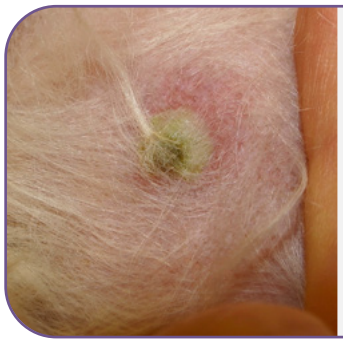
The approach to diagnosis should follow:

SITE → SIGNS → CYTOLOGY & CULTURE

SITE

Site of infection – think about the most likely bacteria found there.

INFECTION	COMMON PATHOGEN(S)
Pyoderma	Staphylococci
Otitis externa	Staphylococci; *Pseudomonas*; *Malassezia*; occ. other Gram+ or Gram- bacteria
Otitis media	Staphylococci; *Pseudomonas*; occ. other Gram+ or Gram- bacteria
Bites	Staphylococci; streptococci, *Pasteurella*; *Prevotella*; fusobacteria; other oral flora; mixed infections common
Cystitis	*E. coli;* other coliforms; staphylococci; enterococci; streptococci
Prostatitis	As above
Gingivitis & periodontitis	Spirochetes; *Porphyromonas*; *Prevotella*; and other oral flora inc. anaerobes; mixed infections common
Cholangio-hepatitis	*E. coli*; less commonly other coliforms; enterococci; staphylococci; streptococci; clostridia; *Actinomyces*; corynebacteria; and many others
Anal sacs	*E. coli*; *Enterococcus*; *Proteus*; clostridia; occ. other Gram+ or Gram- bacteria; mixed infections common
Conjunctivitis	Cats: *Chlamydophila felis*; viruses; *Mycoplasma*; occ. Gram+ or Gram- bacteria. Dogs: staphylococci; streptococci; *E. coli*; *Proteus*
Upper respiratory tract	*Bordetella*; *Mycoplasma*; viruses; occ. Gram+ or Gram- bacteria
Pneumonia Pyothorax	Dogs: usually Gram- aerobes; occ. anaerobes; mixed infections common Cats: *Pasteurella*; *Actinomyces*; other Gram- aerobes/anaerobes; occ. *Nocardia*.
Mastitis	*E. coli*; staphylococci; streptococci
Osteomyelitis Discospondylitis Septic arthritis	Gram+ cocci most likely but a variety or organisms can be seen (inc. anaerobes)
Septicaemia	Staphylococci and *E. coli* most common but a wide variety of aerobes and anaerobes can be seen



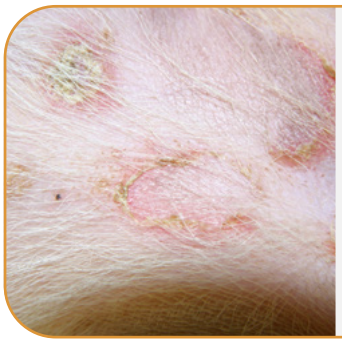
This dog has a bullous pustule

– *These are almost always associated with Staphylococcus pseudintermedius.*

SIGNS

Signs - bacterial infections have a consistent clinical presentation – this is especially true for the skin (see table).

CLINICAL SIGNS	LIKELY DIAGNOSIS	DEPTH
Seborrheic	Bacterial overgrowth syndrome	Surface
Papules, pustules, epidermal collarettes and scaling	Superficial folliculitis Impetigo Superficial spreading pyoderma	Superficial
Erosions and ulcers	Pyotraumatic dermatitis Intertrigo	Surface to superficial Deep if ulcerated
Ulcers and draining sinus tracts	Furunculosis Deep pyoderma	Deep
Nodules and swelling	Cellulitis Abscess	Deep



Epidermal collarettes are distinctive lesions that are highly specific for staphylococcal skin infections.

CYTOLOGY & CULTURE

- **Cytology** will reliably confirm the presence of infection and indicate the most likely type of bacteria (e.g. rods or cocci); most techniques are easy, quick and cheap.
- Where necessary, **culture and antimicrobial susceptibility tests (ASTs)** will identify the bacteria and their antimicrobial susceptibility/resistance.
- **Do not** use ASTs to select topical treatment – AST results and clinical outcomes are poorly correlated.

EMPIRICAL THERAPY IS APPROPRIATE
Topical therapy
First episode of infection
No systemic antimicrobial therapy within 3 months
Simple infections (e.g. surface/superficial pyodermas)
Cytology shows bacteria with predictable antibiotic susceptibility (e.g. staphylococci in skin infections)
AMR is unlikely

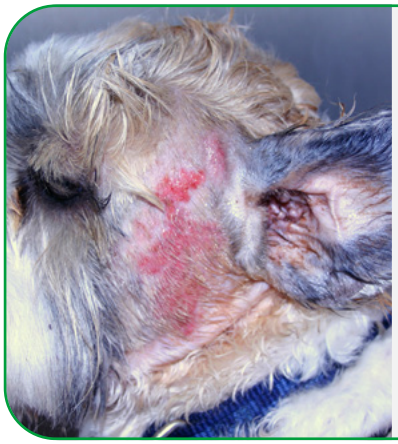
WHEN IS AMR MORE LIKELY?
After multiple antibiotic courses
Non-healing wounds
Post-operative infections
Nosocomial (i.e. healthcare associated) infections
Prolonged hospitalisation and/or ICU care
Implants (e.g. catheters, urinary devices, feeding tubes, surgical implants etc.)

LIFE-THREATENING INFECTIONS THAT NEED IMMEDIATE TREATMENT
Start empirical treatment based on history, clinical signs and cytology
Collect samples for culture & AST
Review treatment when results available

CULTURE AND ASTS ARE NECESSARY
Deep and/or complex infections
Unusual clinical signs/cytology
Rod bacteria
If empirical treatment fails
If AMR is more likely

Does the infection need antibiotic therapy?

- Systemic antibiotics affect the whole microbiome not just the site of infection.
- For mild, non-life threatening, focal, surface or superficial infections:
  - Manage the primary disease
  - Use supportive care
  - Consider topical antiseptics
  - Consider topical antibiotics



This dog has a pyotraumatic skin lesion with a mixed bacterial infection; however, it doesn't need systemic antibiotics

– It will respond to topical cleansing and management of its atopic dermatitis.

Antibiotic selection

If systemic treatment is justified, select an appropriate antibiotic using the site, signs, cytology and culture approach.

Follow treatment guidelines: always aim for the lowest tier & most narrow spectrum antibiotic appropriate for the infection.

Also consider:

Can the antibiotic penetrate to the site of infections? Think about the impact of biofilms, pus, necrosis, scarring & blood-tissue barriers.

Can the owner safely and reliably administer the antibiotic? Use precise instructions (e.g. 'every 12 hours' not 'twice daily') and help make administration easier (flavoured medication, pill pockets or treats, demonstration & training etc.).

Only use long acting injectable antibiotics as a last resort.

TREAT TO CLINICAL CURE

Always treat to clinical cure – i.e. resolution of clinical signs and normal cytology.

There may be residual inflammation or clinical signs associated with underlying condition (e.g. atopic dermatitis) – this does not justify prolonged courses of treatment.

Culture can identify the end-point in some cases (e.g. in normally sterile sites and/or with non-commensal bacteria such as *Pseudomonas*).

Avoid overly long courses of treatment – these do not improve the clinical outcome and increase the selection pressure for AMR.

RECURRENT BACTERIAL INFECTIONS

1. Recurrent bacterial infections are always secondary.
2. Animals with recurrent infections do not have antibiotic deficiencies; they have underlying conditions.
3. The underlying condition must be diagnosed and managed.
4. Repeated antibiotic courses are the biggest single driver of AMR – these must be avoided.

REFERENCES AND RESOURCES

FECAVA posters and guidelines - https://www.fecava.org/policies-actions/guidelines/

BSAVA PROTECT ME antibiotic use guidelines - https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME

International Society for Companion Animal Infectious Diseases - www.iscaid.org

RCVS Knowledge AMR Hub - https://knowledge.rcvs.org.uk/amr/

USE MEDICINES RESPONSIBLY | www.noah.co.uk/responsible

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