Antibiotic use in our practice

The antibiotic guardian(s) of this practice is/are:

ANTIBIOTIC GUARDIAN

PROTECT ME

P rescribe only when necessary

- Consider non-bacterial disease (e.g. viral infection, nutritional imbalance, metabolic disorders)
- Some bacterial diseases will self-resolve without antibiotics
- Offer a non-prescription form (see box bottom right)
- Perioperative antibiotics are **not** a substitute for surgical asepsis

R eplace with non-antibiotic treatments

- Lavage and debridement of infected material, fluid therapy, dietary management, cough suppressants and measures to address underlying conditions may negate the need for antibiotics
- Use topical preparations (ideally antiseptics) where possible to reduce selection pressure on intestinal flora (the microbiome)

O ptimize dosage protocols

- Use the shortest effective course and avoid underdosing
- Treat until clinical resolution

T reat effectively

- Consider which bacteria are likely to be involved
- Consider drug penetration of the target site (e.g. for prostatitis, osteomyelitis)
- Consider pharmacokinetics and drug interactions with concurrent medication
- Provide instructions, including demonstrations, on how to administer prescribed antibiotics

E mploy narrow spectrum

- Use narrow-spectrum, rather than broad-spectrum, antibiotics to minimize resistance
- Avoid antibiotic combination therapy
- Use culture results to support de-escalation (switch to a narrower spectrum antibiotic)

C onduct cytology and culture

- Use cytology to demonstrate bacterial involvement **and** an inflammatory response consistent with infection (e.g. intracellular bacteria)
- Collect a sample for culture **before** starting antibiotic therapy wherever possible
- Culture is essential when using prolonged (>1 week) treatment courses, where there are risk factors for resistance (e.g. healthcare associated infections, antibiotic treatment in the prior 60 days or multiple prior courses/repeated antibiotic use) and in life-threatening situations

T ailor your practice policy

- Discuss your practice's first-line antibiotic choice for each condition with your colleagues, complete the tick boxes in this poster and display it so your protocols are clear, including when the approach is **to not prescribe an antibiotic**
- Evaluate practice biosecurity and hand hygiene protocols
- Practice preventative medicine (vaccination, parasite prevention)

M onitor

- Monitor for preventable infections (e.g. surgical site infections) and alter practice protocols if needed
- Audit your own antibiotic use, particularly of EMA **Restrict** category antibiotics (fluoroquinolones/3rd generation cephalosporins), e.g. using RCVS Knowledge Audit tool

E ducate others

- Promote awareness of AMR among staff and clients (use tools such as the owner education animation)
- Encourage return of leftover antibiotics for safe disposal

BSAVA BRITISH SMALL ANIMAL VETERINARY ASSOCIATION · Small Animal Medicine Society · RCVS KNOWLEDGE

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Select which antibiotics your practice uses in the boxes below

E Culture ESSENTIAL to ensure effective therapy

A Culture strongly ADVISED to guide therapy (where possible)

Cytology advised to guide therapy

Consult QR code information for dedicated resources to support medicating cats

Scan the QR codes to access extra information. Alternatively visit: bsavalibrary.com/protectme

GASTROINTESTINAL INFECTIONS

Antibiotics are not indicated for:
- Acute vomiting
- Acute diarrhoea (including acute haemorrhagic (AHDS) cases) unless sepsis
- Pancreatitis
- Gastric *Helicobacter* infections
- *Campylobacter, Salmonella, Clostridium perfringens* or *C. difficile* infections
- Chronic diarrhoea

Acute diarrhoea with signs of sepsis:
See 'Life threatening infections'
Parvovirus ONLY if neutrophil count <1x10⁹/l
- ☐ Ampicillin or amoxicillin or cefalexin
- ☐ Amoxicillin/clavulanate

Clinical *Giardia* infection:
- ☐ Fenbendazole for 5 days

ONLY use metronidazole if fenbendazole AND environmental management strategies ineffective

Chronic diarrhoea/chronic enteropathy ('inflammatory bowel disease'):
- ☐ Diagnostics and treatments including *Giardia* treatment, dietary management, measures to address dysbiosis (e.g. prebiotics, probiotics or faecal matter transplantation) and/or a prednisolone trial should be performed BEFORE an antibiotic trial
- ☐ The use of antibiotics for putative immunomodulatory or anti-inflammatory effects is discouraged

Cholangitis/cholangiohepatitis (consult QR code):
- ☐ Amoxicillin/clavulanate
- ☐ Ampicillin
- ☐ Cefalexin

If refractory to first-line therapy
- ☐ Marbofloxacin OR enrofloxacin (dogs only)

Treat for 2 weeks then reassess. Monitor liver enzyme activities/bilirubin

URINARY TRACT INFECTIONS

Antibiotics are not indicated for:
- Feline idiopathic cystitis
- Feline urolithiasis and canine non-struvite urolithiasis
- Urinary incontinence
- Subclinical bacteriuria (canine or feline) including animals with hyperadrenocorticism, diabetes mellitus or spinal cord injury
- Canine juvenile vaginitis

Sporadic cystitis (bacterial urinary tract infection):
- ☐ Amoxicillin (± clavulanate)
- ☐ Trimethoprim/sulphonamide

Treat for 3–5 days

Recurrent cystitis
Reinfection, recurrent and persistent urinary tract infections:
- ☐ Amoxicillin (± clavulanate)
- ☐ Trimethoprim/sulphonamide

If recurrent/persistent infection, modify selection based on susceptibility testing
If recurrence, pending susceptibility testing use the SAME antibiotic for 3–5 days if previously successful
Review predisposing factors (e.g. urolithiasis, anatomical abnormalities)
Treat for 7–10 days

Prostatitis (entire males):
- ☐ Trimethoprim/sulphonamide
- ☐ Fluoroquinolone (enrofloxacin 10 mg/kg IV q24h (dogs only) OR marbofloxacin 5 mg/kg)

Treat for 2–4 weeks AND perform medical/surgical castration

Urolithiasis (≠ crystalluria):
Canine struvite urolithiasis
- ☐ Amoxicillin (± clavulanate) until resolution of urolithiasis

Dietary modification and urine acidification useful for dissolution
Consider surgical removal

Acute pyelonephritis (consult QR code):
- ☐ Fluoroquinolone
- ☐ Trimethoprim/sulphonamide

Consider IV if signs of sepsis
Treat for 10–14 days

ORAL INFECTIONS

Consider 0.12% chlorhexidine mouthwash or gels/pastes
Antibiotics are not indicated for:
- Canine chronic ulcerative stomatitis
- Gingivitis/periodontitis
- Feline chronic gingivostomatitis
- Fractured teeth
- Tooth root abscess (unless facial cellutitis is evident)
- Dental procedures including tooth extractions

Osteomyelitis (confirmed via histopathology):
- ☐ Amoxicillin/clavulanate for 4–6 weeks or as indicated by fresh tissue culture

Oral swabs usually grow oral commensals: culture fresh tissue

Facial cellulitis (for emergency pain relief rather than definitive treatment):
- ☐ Amoxicillin/clavulanate

EYE INFECTIONS

Conjunctivitis:
- ☐ Fusidic acid
- ☐ Chlortetracycline
- ☐ Chloramphenicol

Treat for 5–7 days
Cats: consider viral infection (e.g. feline herpesvirus type-1) or other ocular diseases (e.g. eyelid abnormalities) if not responding
Dogs: primary bacterial conjunctivitis uncommon. Rule out underlying ocular diseases (e.g. keratoconjunctivitis sicca (KCS), allergic disease, eyelid abnormalities)

Feline-specific disease:
Chlamydophila felis
- ☐ Systemic doxycycline (amoxicillin/clavulanate in pregnant queens and kittens)

Treat for 21–28 days
Mycoplasma felis
- ☐ Topical chlortetracycline
- ☐ Systemic doxycycline

Treat for 21–28 days

Uncomplicated corneal ulceration (superficial corneal ulcers):
- ☐ Topical chloramphenicol

Treat until the corneal ulcer has re-epithelialized
Rule out spontaneous chronic corneal epithelial defects or perpetuating factors (e.g. KCS, eyelid abnormalities) if failing to heal

Complicated corneal ulceration/infectious keratitis (stromal corneal ulcer, keratomalacia):
- ☐ Topical chloramphenicol + gentamicin
- ☐ Topical chloramphenicol + ciprofloxacin
- ☐ Topical chloramphenicol + ofloxacin

Treat until the corneal ulcer has re-epithelialized (q2–4h for the first 48 hours, q6–8h once destructive corneal process has stopped)
Base initial antibiotic choice on cytology and adjust if required following susceptibility testing. Consider adding topical serum/plasma
If corneal perforation
- ☐ Consider systemic antibiotic (amoxicillin/clavulanate)

Orbital abscessation/bacterial cellulitis:
- ☐ Amoxicillin/clavulanate
- ☐ Cefalexin and metronidazole
- ☐ Cefalexin and clindamycin

Treat for a minimum of 2 weeks, ideally based on susceptibility testing
Attempt drainage via most appropriate route (based on advanced imaging of the orbit), usually via mouth (oral mucosa behind last molar)

LIFE THREATENING INFECTIONS

Use of antibiotics other than those listed should be based on susceptibility testing
There is no universally accepted veterinary definition of sepsis, but it may be suspected in dogs and cats who are systemically unstable due to a presumptive or diagnosed bacterial burden, clinically this may manifest as:
- Refractory hypotension (systolic <90 mmHg) despite appropriate volume resuscitation
- Hypoglycaemia requiring supplementation
- Neutropenia (see below)

Bacteraemia/sepsis:
- ☐ Amoxicillin/clavulanate 20 mg/kg IV q8h

If recent (<3 months) beta lactam administration
- ☐ Fluoroquinolone (enrofloxacin 10 mg/kg IV q24h (dogs) OR marbofloxacin 5 mg/kg IV q24h (cats)) AND clindamycin 11 mg/kg IV q12h OR metronidazole 10 mg/kg IV q12h

Investigations must be performed to identify likely source and obtain samples (i.e. urine, bile, effusions, airway wash). Source control surgery required if amenable
Transition to oral medication when clinical signs improve. Base duration on improvement in clinical signs (patient demeanour, pyrexia ± CRP (dogs only))

Septic peritonitis:
- ☐ Amoxicillin/clavulanate 20 mg/kg IV q8h
- ☐ ADD fluoroquinolone if recent (<3 months) beta lactam administration

If amoxicillin/clavulanate unavailable
- ☐ Cefuroxime 20 mg/kg IV q8h AND clindamycin 11 mg/kg IV q12h OR metronidazole 10 mg/kg IV q12h

If colonic perforation
- ☐ ADD metronidazole 10 mg/kg IV q12h

Definitive source control essential as soon as possible
Transition to oral administration when clinical signs improve. Base duration on improvement in clinical signs (patient demeanour, pyrexia ± CRP (dogs only)). Courses as short as 4 days are used in humans

Neutropenia:
Mild (neutrophil count >1000/µl) AND well
- ☐ No antibiotic required

Moderate (neutrophil count <1000/µl) AND well
- ☐ Cefalexin PO
- ☐ Amoxicillin/clavulanate PO
- ☐ Trimethoprim/sulphonamide PO

Severe (neutrophil count <500/µl) OR **mild/moderate neutropenia** AND unwell (e.g. hypotension despite fluids, hypoglycaemia with sepsis suspected, severe gastrointestinal signs or pyrexia)
- ☐ Amoxicillin/clavulanate OR cefuroxime IV

Stop antibiotics when neutrophil count >1000/µl

ORTHOPAEDIC INFECTIONS

Discospondylitis:
- ☐ Cefalexin
- ☐ Amoxicillin/clavulanate
- ☐ Trimethoprim/sulfadiazine
- ☐ Clindamycin

Intravenously, if severe neurological compromise or signs of sepsis
Treat for minimum 6–8 weeks (based on clinical response)

Bacterial infective (septic) arthritis:
- ☐ Cefalexin
- ☐ Amoxicillin/clavulanate

Treat for 4 weeks OR until synovial fluid neutrophils <3%

Osteomyelitis:
- ☐ Cefalexin OR cefuroxime
- ☐ Amoxicillin/clavulanate

Intravenously for first 2–3 days then orally for 6–8 weeks

SKIN INFECTIONS

Identify underlying disease as skin infection is ALWAYS secondary
Antibiotics are not indicated for:
- *Malassezia* dermatitis
- Ectoparasites, pruritus
- Anal sac impactions

Surface pyoderma (hot spots, intertrigo):
Topical treatment ONLY
- ☐ 2–4% chlorhexidine or other antiseptics q1–3d

If not responsive or very severe
- ☐ Fusidic acid ± glucocorticoid (cocci)
- ☐ Silver sulphadiazine (if rods)

Superficial pyoderma:
Topical treatment ONLY is appropriate
Review after 2–3 weeks and continue until underlying cause controlled
- ☐ 2–4% chlorhexidine q1–3d

If non-responsive to topical antibiotic therapy
- ☐ Clindamycin
- ☐ Trimethoprim/sulphonamide
- ☐ Cefalexin
- ☐ Amoxicillin/clavulanate

Systemic antibiotics ALWAYS in combination with topical antiseptics (q1–3d)
Treat for 2 weeks then reassess. If poor response investigate resistance (cytology, culture and susceptibility testing)
Use doses at upper end of range
ALWAYS culture if there is a history of MRSP/MRSA OR prior antibiotic courses OR if rods are seen on cytology

Deep pyoderma:
Whilst culture and susceptibility testing pending, ONLY start systemic antibiotic (as for superficial pyoderma) if painful OR risk of septicaemia
- ☐ Concurrent topical treatment with 2–4% chlorhexidine q1–3d

Treat for minimum 3 weeks and reassess q2w (consult QR code)

Anal sac inflammation/engorgement:
Topical treatment ONLY
- ☐ Manual evacuation, flushing with chlorhexidine ± packing with topical polypharmacy ear product (avoid products containing EMA category B antibiotics)

Anal sac abscessation:
Flush and drain as appropriate
ONLY if signs of cellulitis
- ☐ Trimethoprim/sulphonamide
- ☐ Amoxicillin/clavulanate

EAR INFECTIONS

Antibiotics are not indicated for:
- *Malassezia* dermatitis
- Ectoparasites, pruritus

Otitis externa:
Topical treatment ONLY
Care: integrity of tympanic membrane. Avoid ototoxic products if tympanic membrane ruptured
If cocci
- ☐ Antiseptic ear cleaner + topical ± systemic steroid products

If no response after 7 days ADD topical antibiotic + cleaning
- ☐ Fusidic acid/framycetin
- ☐ Florfenicol

If rods
- ☐ Antiseptic ear cleaner whilst awaiting culture results
- ☐ Gentamicin
- ☐ Framycetin

If *Pseudomonas* cultured ADD TrisEDTA + topical antibiotic
Treat until cytology negative and underlying cause corrected

RESPIRATORY INFECTIONS

Antibiotics are not indicated for:
- Chronic bronchitis/allergic airway disease/feline asthma unless secondarily infected
- Sinonasal disease
- Nasal discharge – bacteria are NOT primary nasal pathogens

Canine infectious respiratory disease complex (kennel cough) and feline upper respiratory tract infection (cat 'flu):
ONLY if clinical signs present >10 days and/or unwell
- ☐ Doxycycline
- ☐ Amoxicillin/clavulanate

Treat for 5–7 days
Culture nasal tissue NOT nasal discharge from refractory cases

Pneumonia (including aspiration pneumonia/pneumonitis):
- ☐ Oxygen therapy and analgesia may be sufficient in some cases (provided close monitoring is available)
- ☐ Amoxicillin/clavulanate

Treat for 3–7 days and review based on clinical signs ± C-reactive protein (dogs only)
If clinical deterioration/failure to respond despite first-line therapy
- ☐ Fluoroquinoline + clindamycin

If suspected *Bordetella bronchiseptica*
- ☐ Doxycycline

Pyothorax:
Surgical exploration and lavage, or lavage via thoracostomy tubes
- ☐ Amoxicillin/clavulanate 20 mg/kg IV q8h

If patient has received beta lactam antibiotic within the last 3 months
- ☐ Clindamycin 11 mg/kg IV q12h

AND enrofloxacin 10 mg/kg IV q24h (dogs only) OR marbofloxacin 5 mg/kg IV q24h
Treat for 2 weeks OR based on improvement in clinical signs (patient demeanour, radiographic/ultrasonographic resolution ± C-reactive protein (dogs only))
If *Nocardia* suspected (dogs)
- ☐ Trimethoprim/sulphonamide

SURGICAL USE

Prophylactic antibiotics are not indicated for:
- Clean surgical procedures including many orthopaedic procedures
- Dental procedures including tooth extractions
- Postoperative use for ANY procedure unless treating known infection

Prophylactic (perioperative) antibiotics are appropriate:
- For prolonged clean surgery (anticipated >90 minutes)
- For surgery involving an implant (e.g. pin, screw, plate or stent)
- For surgery involving entry into a hollow viscus (e.g. gastrointestinal tract, urinary tract) or where a joint capsule is penetrated
- For debilitated or immunosuppressed patients (ASA score 3 or above)

- ☐ Cefuroxime 20 mg/kg IV
- ☐ Cefazolin 22 mg/kg IV
- ☐ Amoxicillin/clavulanate 20 mg/kg IV

Administer 30–60 minutes before the first incision, then every 90 (amoxicillin/clavulanate) or 120 (cefuroxime, cefazolin) minutes until the end of surgery
Where anaerobic involvement is highly likely (e.g. colonic surgery)
- ☐ ADD metronidazole 10 mg/kg IV

Do not continue antibiotics beyond the day of surgery, unless there is a therapeutic indication

Therapeutic antibiotics are indicated:
To treat a KNOWN bacterial infection (e.g. septic peritonitis) or if there is pre-existing remote infection
Where there is an obvious major break in asepsis causing significant contamination of the surgical site
For 2–3 days postoperatively for open fractures
Until source control has been achieved AND sufficient clinical improvement documented for dirty procedures

MISCELLANEOUS INFECTIONS

Surgically managed pyometra:
If stable
- ☐ No antibiotics

If unwell, consider perioperative
- ☐ Amoxicillin (± clavulanate)
- ☐ Cefalexin + enrofloxacin

Medically managed pyometra:
- ☐ Amoxicillin (± clavulanate)

Mastitis:
- ☐ Cefalexin
- ☐ Amoxicillin/clavulanate
- ☐ Trimethoprim/sulphonamide

Treat for 2–3 weeks or until offspring weaned (early weaning NOT advised)

***Mycoplasma haemofelis* (feline infectious anaemia):**
- ☐ Doxycycline

Treat for 2–4 weeks

Suspected leptospirosis:
- ☐ Amoxicillin (± clavulanate)
- ☐ Doxycycline (may achieve improved renal clearance)

Treat for 2 weeks

Hepatic encephalopathy:
Diet and lactulose should be first line therapies
ONLY if clinical signs persistent despite dose escalation
- ☐ Metronidazole (decreased dose)
- ☐ Amoxicillin
- ☐ Ampicillin

Use ONLY until clinical signs are controlled

WOUNDS AND SURGICAL SITE INFECTIONS

Antibiotics are not indicated for:
- Cat bite abscess (unless surrounding cellulitis or pyrexia)
- Cutaneous surgical site dehiscence without gross evidence of systemic or surgical site infection (SSI)
- Acute superficial traumatic wounds
- Snake bites

Bites and traumatic wounds:
Decontaminate and debride (lavage ± surgical debridement ± use of dressings)
If systemically well and not pyrexic
- ☐ Wound lavage with isotonic solution (e.g. saline)

If wound located over abdomen or thorax
- ☐ Further investigation (imaging) ± surgical exploration may be required

If systemically unwell OR pyrexic OR suspicion of cavity penetration
- ☐ Cefuroxime ± cefalexin
- ☐ Amoxicillin/clavulanate

Acute bite wound prophylaxis
- ☐ Thorough flushing with saline + open wound management
- ☐ Systemic antibiotics not required if affected region is superficial and localized
- ☐ Amoxicillin/clavulanate (for 1–3 days or until tissues declared viable) if bite at critical site

Superficial SSI:
Topical treatment ONLY
- ☐ Frequent saline lavage

Deep SSI:
If systemically unwell OR pyrexic OR local cellulitis/purulent discharge from deep incision
- ☐ Cefuroxime OR cefalexin
- ☐ Amoxicillin/clavulanate

If rods are seen on cytology, or prior antibiotic courses
- ☐ Consider ADDING fluoroquinolone

If there is a history of MRSP/MRSA
- ☐ Await susceptibility testing and assess clinical response before adapting treatment

Treat for 1–2 weeks guided by clinical progression

Organ space or implant-associated SSI:
As for deep SSI whilst culture pending, systemic antibiotic therapy based on cytology with duration of therapy guided by clinical progression following source control
Source control (e.g. removal of infected implant material) critical to successful treatment

ADVERSE REACTIONS TO ANTIBIOTICS

Certain antibiotics can cause serious adverse effects, including nephrotoxicity, anaphylactoid reactions, blindness, dysbiosis, hypersensitivity reactions, keratoconjunctivitis sicca and immune complex reactions. This list is not comprehensive.

Consult QR code for additional information on at-risk groups and recommendations to minimize risks.

European Medicines Agency antibiotic categories

Category A (Avoid): DO NOT USE
Antibiotics with restricted use in human medicine (e.g. imipenem, linezolid, teicoplanin, vancomycin) **should not be used** in animals.

Category B (Restrict): the highest priority critically important antibiotics
The use of fluoroquinolones (enrofloxacin, marbofloxacin, pradofloxacin, ciprofloxacin) and 3rd generation cephalosporins (cefovecin) **should be restricted** to mitigate the risk to public health. Samples should be submitted for antibiotic susceptibility testing before starting these agents where possible.

Category C (Caution)
Should only be used when there are no suitable antibiotics in Category D that would be clinically effective.

Category D (Prudence): first-line antibiotics
The use of first-line antibiotics **should be limited** to times of genuine clinical need. Avoid all unnecessary use and long treatment periods.

Responsible antibiotic use under the cascade

'...it is justifiable, on a case-by-case basis, to prescribe an antibiotic on the cascade **in the interests of minimizing the development of resistance**, particularly where culture and sensitivity data indicate that a particular antibiotic active substance is effective against a bacterial pathogen and where knowledge of pharmacokinetics indicates that the selected product is likely to be safe and effective for the animal species and condition being treated.'
– VMD Summary Position Statement

Use non-prescription forms, available from the BSAVA Library. The forms support your decision not to prescribe an antibiotic.

Signpost owners to further information on the risks of unnecessary antibiotic use, including the owner education animation.

For further information on individual drugs and dosages, see *BSAVA Small Animal Formulary*.