Guidelines Case Example: Creating Clinical Guidelines by Blue Cross

Section A: The seven steps to creating clinical guidelines using Blue Cross as a case example.

A guideline is a brief document with specific advice that can help veterinary staff make good decisions in practice through evidence-based information.

Guidelines do not replace clinical expertise or knowledge. Rather, guidelines should be used in conjunction with clinical expertise and knowledge to assist and improve the quality of care delivered.

This case example uses the Guidelines Walkthrough to show Blue Cross developed their clinical guidelines. You can access the original Walkthrough, and other support tools, which are referred to in this document, at www.rcvsknowledge.org/quality-improvement/tools-and-resources.

1. Decide what the guideline will address

Identify the topic and scope of the practice guideline and the specific question(s) to be addressed. The scope of the guideline must be clearly stated together with the context and objectives.

The Blue Cross decided to create clinical guidelines for the commonly seen disease processes in practice. This was to help the veterinary team in becoming more confident in diagnosis and treatment, and to provide a more consistent service across the hospital and branches.

2. Allocate team members to research and review the evidence

Decide who will be involved in research and allocate roles, while considering the team members that will use the guideline. It is important to involve as many members of the team as possible in the production of the guidelines. Roles would include author(s), person carrying out the literature search, and evidence review. Evidence for these areas can be gathered by carrying out a literature search and obtaining relevant opinions where appropriate. If evidence from veterinary research is lacking, it may be helpful to also search medical literature. RCVS Knowledge has a range of resources that can assist you in finding evidence. If you need assistance in performing a literature search, or are short of time, you can complete a literature search request form and submit it to the RCVS Knowledge Library team. For further information, you can contact the library team at library@rcvsknowledge.org.

The Senior Veterinary Surgeon, Alison Thomas, prepared a list of over 60 common syndromes and disease processes. She then allocated team members to perform literature reviews to gather evidence for each syndrome and lead the development of the guideline. Team members were chosen based on their personal interests and individual qualifications.

3. Hold a meeting to review and discuss the evidence

The team then reviews and assesses the evidence based on agreed criteria. It can help to separate any discussed actions into 'clinical examination', 'diagnostic tests', 'treatment' and 'follow-up care' in preparation for Stage 4 of this Walkthrough. It is important to involve a range of members of the veterinary team to discuss how the evidence can be applied in your particular practice setting. You can use the RCVS Knowledge Guidelines Template to help you provide structure to your meeting. Collected evidence was discussed alongside the charity's scope of service, treatment options, cost and the patient's quality of life to see how they could be beneficial to all. The evidence was then split to include a summary, guidance notes for the veterinary team and guidance notes for the pet owner.

4. Once the team has come to an agreement, create a guideline draft

The recommendations should be specific and unambiguous, consider potential barriers, and suggest some supportive tools for implementation. Using the RCVS Knowledge document, *Guidelines Template,* write a draft of the guideline. The team should agree on the draft. For each disease, the evidence gathered and information developed in step 3 were combined to produce guidelines drafts. Protected time was given to allow for the creation of these, and in some cases, locum staff were hired to ensure this time was available.

5. Provide the draft to the relevant team members for review

The guideline draft should be provided to all team members identified in the scope of the guideline. Team members should be encouraged to ask questions and provide feedback on what should be included in the guidelines. The draft guidelines allowed for team discussion on differing treatments, potential patient side effects, patient quality of life and owner expectations.

6. Once everyone has reviewed the guideline, release the final version

Once the team have considered the feedback and suggestions, the guideline can be finalised. We recommend using the same format across all guidelines for ease of accessing the information. Examples of the final versions can be seen alongside this case example.

7. Set a date for implementation and a date for review

The team should set a reasonable date on which they will begin implementing the guideline in practice. The implementation date should allow all members of the team to understand the guideline. Typically, this would be put in the footer of the document so that it can be easily assessed. After implementation, it may be worth raising the topic of guidelines at a practice meeting to ask the team if they are finding the guideline useful. You may choose to measure the impact of guideline introduction through clinical audit. If the guideline is completely new, it may be worth scheduling a review within six months of its release. After this, the review date for the guideline can be every year or every two years, depending on clinical relevance. Blue Cross conducted a clinical audit to measure the impact of the guidelines. Results showed a 15% decrease in the cost of treatment per pet helped. Although this could not solely be attributed to the guidelines, it showed that they played a large part in this reduction. Other benefits were identified, which included additional CPD for veterinary team members, improved consistency of care and the reduction of client complaints due to improved informing of options.

Guidelines Case Example: Creating Clinical Guidelines by Blue Cross

Section B: Developing guidelines in practise, using Blue Cross as an example

Name of initiative: Development of Blue Cross Clinical Guidelines

Initiative start date: January 2017

Submitted by: David Catlow Clinical Director

Practice/organisation:

Introduction

In early 2016, The Blue Cross Clinical Directorate developed a 3-year strategy and plan. The strategy was initially informed by asking our veterinary teams to identify what they would stop, start and continue to do, with the purpose of optimising the impact of our work on pet welfare. We focussed on identifying which of many suggestions should be our priorities. They included many aspects of running veterinary practice including making improvements to our ways of working, efficiencies and providing a consistent quality and scope of service whilst maximising the number of pets that we help and ensuring we create a great place to work and improving the client experience.

A concern was raised that many veterinary surgeons have a different approach to treating clinical cases. There continue to be significant advances in diagnostics and developments of new and novel treatments as well as different levels of knowledge and experience within the team, so in the charity setting where we have a limited budget it is essential that we endeavour to provide a consistent service of an acceptable standard. We are not able to offer every possible treatment option for every pet. We do not offer referral and specialist veterinary services, and with new staff and locums working for us regularly, how could we ensure that we offer a consistent Blue Cross approach to veterinary care?

A commitment was therefore made to develop 'evidence-based' Clinical Guidelines to help any person working for Blue Cross to understand our Scope of Service and ensure we deliver a consistent and pragmatic veterinary service. The aim was to develop something akin to the UK medical profession's NICE guidelines for Blue Cross.

Aims

To develop evidence-based Clinical Guidelines for over 60 syndromes and conditions to help clinicians confidently deliver a pragmatic veterinary service in the charity hospital.

Actions

Alison Thomas, Senior Veterinary Surgeon at Blue Cross, compiled a list of over 60 common syndromes and conditions where it was perceived that a clinical guideline would help veterinary surgeons deliver a more consistent approach to diagnosis and treatment of those conditions.

Guidelines would consist of a summary document, guidance notes and owner notes

Alison Thomas led the project. She identified a vet to lead the development of each guideline with the relevant subject special interest and/or post graduate qualification.

Draft clinical guidelines were informed by:

- collating latest information, trends and knowledge
- literature search for relevant papers through VIN and RCVS library
- animal welfare and quality of life considerations
- ethical considerations
- latest treatments and alternative treatment options
- assessments of efficacy and potential side effects of different treatment options
- cost of treatment
- a general policy to never deny treatment
- establishing clarity on what is in our scope of service and what we won't offer
- establishing clarity on what medicines will we provide and those which we don't, but for which we will supply a private prescription to be filled at the clients expense

Results

The development and completion of approx. 60 clinical guidelines (summary guideline; further guidance notes; owner guidance notes) for commonly presented conditions based on best available evidence and consideration for delivery in a charity animal hospital setting.

Clinical Guidelines have facilitated a more consistent delivery of our service in our hospitals as well as helped deliver consistent advice across the organisation and to external partners.

The guidelines have given Blue Cross a significant platform to inform and facilitate our future strategy by helping to define a clear framework for the delivery of a pragmatic first opinion veterinary service for those less able to afford veterinary treatment.

Impact of intervention

The development of Clinical Guidelines at Blue Cross has had significant benefits for the organisation. Some of the benefits were expected and others were not.

The investment of time and resource has been considerable with a risk being that their creation would become an academic exercise only and not necessarily have a significant impact on ways of working.

Making time on top of existing BAU workload has been a significant added challenge, as well as the added cost of locum cover to make time available for their creation.

The impact includes:

- An engaged veterinary team aligned with the purpose and anticipated benefits of the project
- CPD benefits of those involved in the process of researching the clinical guidelines
- Clarity of treatment options the charity will deliver and better consistency.
- Information to help communicate our treatment decisions to clients, which helps to prevent complaints.
- They inform clinical M&M meetings and governance discussions.
- They are referred to when discussing more complex cases with less experienced vets seeking advice.
- Inform consistent advice given to external vets in our PCC partnerships as well as those providing vet services to our rehoming centres and other internal services.
- Positive feedback from other directorates within Blue Cross who often seek advice from clinical teams
- Positive feedback from external practice partners and other charities in UK and overseas with requests to share our CGs
- A useful tool to facilitate clinical audit and governance that is engaging for the veterinary teams
- A useful tool for internal M&M rounds and internal CPD

Patient and client benefits include:

- More consistent service and improved communications with clients
- Better clinical outcomes
- Better quality consultations

Practice benefits include:

- Financial savings/cost efficiencies
- Improved audit processes
- Improved productivity
- Inter-professional learning
- More patients seen

The development of our guidelines has coincided with a significant reduction in our cost per pet helped. Whilst difficult to measure the financial impact of introducing clinical guidelines in isolation, alongside other changes to ways of working, Blue Cross is currently looking at a reduction in the gross cost per pet helped of almost 20% and a 28% reduction in the medicines cost per pet helped over the last 2 years. We are currently on track to treat 11% more pets in our hospitals than 2016. (This represents an additional 2,639 pets.)

As of February 2019, the cost per pet helped has reduced by 15% (which equates to 26,800 pets helped for approximately £400,000 less than the total cost of helping 24,161 pets). These efficiency savings cannot be attributed solely to clinical guidelines but the guidelines have played a significant part. The medicines costs per pet helped have been reduced by £9 per pet, which constitutes a 28% reduction. Therefore, the costs saved were recuperated very quickly.

Interested in submitting your own case example? Email us at ebvm@rcvsknowledge.org.

Approach to dogs and cats with diarrhoea

KEY POINTS
- Probiotics not available under Blue Cross scope of service (see supporting notes)
- Please do not use antibiotics in the management of diarrhoea other than in the situations described
- Faecal cultures are rarely helpful
- GI biopsies should be rarely recommended

Diarrhoea

Mild and acute → **Dietary management** → **No response**

Severe or chronic

- Broad spectrum anthelmintic (unless worming up to date)
- Consider 5-7d course of 50mg/kg fenbendazole against helminths and Giardia
- Consider monthly deworming 2x to r/o Trichuris vulpis (dogs)
- Consider direct faecal smear for Giardia (dogs and cats) or Tritrichomonas foetus (cats; especially if pedigree or multi-cat household).
- If haemorrhagic (dogs), perform parvo test and isolate regardless of cause.

No response → **Consider metronidazole for 7-14d**

No response. Secondary GI disease suspected → **Clinical pathology: Depending on signalment tests may include T4, liver profile, TLI, ACTH stim to r/o hypoA (dogs)** → **Treat secondary GI disease accordingly**

No response. Primary GI disease suspected

Cats

- Recommend a hypoallergenic/novel protein diet trial for 4-6wks
- Consider cobalamin measurement and supplementation

Dogs (L1)

- Add soluble fibre
- If boxer/FBD and fibre has been unsuccessful, consider histiocytic colitis (biopsy 1st) › 6-8 weeks of enrofloxacin
- Recommend a hypoallergenic/novel protein diet trial for 4-6wks

Dogs (S1)

- SI diarrhoea persisting for >7-10d; consider treating for ARD with oxytetracycline, tylosin or amoxicillin for 4-6wks.
- Recommend a hypoallergenic/novel protein diet trial for 4-6wks
- Consider imaging
- Consider cobalamin measurement and supplementation

No or poor response

If all else fails or if there is hypoproteinaemia, severe tenesmus or indicators that neoplasia may be present (eg marked wt loss), consider:
- Referral
- Immunosuppressive trial
- GI biopsies by endoscopy or ex-lap
- Euthanasia if prognosis deemed poor

Diarrhoea in dogs and cats

(Read in conjunction with flowchart)

Many acute cases require little diagnostic intervention and resolve with or without symptomatic treatment. Chronic diarrhoea however usually does not respond to symptomatic treatment and can be a diagnostic challenge. Before deciding whether further investigation is necessary, decide whether the diarrhoea is:

- Acute or chronic
- Mild or severe
- Small* or large** bowel (Signs may be mixed in some cases)
- Likely to be due to primary or secondary disease***

*Small bowel diarrhoea features may include:

- ✓ Increased bulk
- ✓ Projectile
- ✓ Melaena
- ✓ Grey colour (may suggest undigested food)
- ✓ Green colour (may suggest malabsorption)
- ✓ Weight loss
- ✓ Vomiting
- ✓ Borborygmi
- ✓ Variable appetite
- ✓ Sometimes dehydration.

**Large bowel diarrhoea features may include:

- ✓ Small volume
- ✓ Increased frequency
- ✓ Tenesmus
- ✓ Haematochezia
- ✓ Mucus

NB Weight loss and vomiting are uncommon, appetite and hydration usually unaffected

***Diarrhoea due to primary GI disease is more common than secondary, and in those with secondary disease, diarrhoea is not usually the primary presenting complaint.

When to investigate

Diarrhoea that is persistent despite symptomatic treatment.
Chronic or severe diarrhoea especially associated with significant weight loss, dehydration or systemic illness.
NB: Fulminating acute diarrhoea eg. HGE may not require extensive diagnostics but will require intensive supportive therapy on an inpatient basis. In contrast, chronic diarrhoea persisting for weeks or months requires investigation likely including clinical pathology and imaging.

See flowchart for a pragmatic approach to the patient with diarrhoea.

When to perform faecal analysis

Direct examination of fresh faeces: *giardia* spp, *coccidian* spp, ova
Sensitivity can be increased by zinc sulphate flotation and pooling 3 separate samples (approximately 95% sensitive).
ELISA test identifies Giardia antigen in faeces and is 90% sensitive. It is more sensitive than zinc flotation if only a single sample is available.
A negative result does not necessarily exclude Giardia so treatment with fenbendazole should be considered regardless.

Microbial culture of faeces is often unrewarding due to the abundant normal flora in the gut. Some organisms are labile and difficult to culture.
More importantly, the isolation of a pathogen does not prove it is the cause of the diarrhoea: pathogenic organisms may be present in the faeces of clinically healthy animals, either because the animal is an asymptomatic carrier or because the organism is "just passing through." For example *campylobacter spp* have been isolated in up to 30% of healthy dogs.

Limit faecal culture to cases where diarrhoea is acute and haemorrhagic or very severe, especially in the following situations:

- multiple animals in a crowded environment eg. kennels
- if the owner is immunocompromised or affected by diarrhoea themselves

Overall most dogs and cats do not require faecal culture, it rarely adds to the clinical picture and increases overall costs of the investigation. Additionally it may lead to increased use of antibiotics where they are not needed.

Faecal PCR

Consider testing for parvovirus in dogs with haemorrhagic gastroenteritis, especially young unvaccinated puppies.

Consider testing for *Trtrichomonas* in cats with large bowel diarrhoea, especially young pedigree cats. Typical signs include mucousy stools with blood, dripping stools from the anus.

Cobalamin measurement and supplementation

- Cobalamin deficiency is common in EPI and longstanding GI disease in dogs and cats.
- Hereditary cobalamin deficiency has been recorded in the Giant Schnauzer, Beagle, Border Collie, Australian Shepherd, and Chinese Sharpei
- Potential deficiency should be considered in all cases of EPI and in cases of SI diarrhoea which are ongoing beyond 3 weeks.
- Patients with cobalamin deficiency often do not respond well to therapy for their GI disease until cobalamin is supplemented, as the deficiency can be both a cause and effect of GI disease.
- Serum cobalamin measurement can be performed, but may not always reflect cobalamin at a cellular level. Generally supplementation is recommended if cobalamin is in the low normal range, in addition to those where it is subnormal.
- Supplementation is by s/c injection 150-250µg per cat and 250-1500µg per dog weekly for 6 weeks, then every 14 days for 6 weeks, then after a further 30 days.
- There is not likely to be any harm in over-supplementing, and serum cobalamin levels are

sometimes unreliable, therefore empirical supplementation can be considered (especially in cats). However, if the full schedule is to be followed involving multiple visits over 3 months, serum measurement may be advisable in dogs, since supplementation is less likely to be beneficial if serum cobalamin is mid to high normal range. **Cobalamin is available as a single blood test which should be chosen in this situation** (cost to us £16.06) compared to folate cobalamin (cost to us £21.68) or TLI, folate cobalamin (cost to us £32.01 dogs and £42.38 cats).

When to consider imaging

X-ray and ultrasound have limited value in chronic diarrhea cases. Consider where secondary GI disease is suspected, or where there are palpable abnormalities. Whilst ultrasound can be useful to measure bowel wall thickness and examine the layers of the wall, a hypoallergenic/novel protein diet should be trialled for 4-6wks in the majority of cases which are systemically well.

When to consider GI biopsies

Intestinal biopsy is primarily indicated to characterise infiltrative gut disease (IBD vs lymphangiectasia vs neoplasia). GI biopsy can be considered if small intestinal disease is confirmed by appropriate means, and factors such as parasites, antibiotic responsive diarrhoea (ARD) or dietary causes are ruled out.

If biopsy confirms IBD, this is not a single disease and detection of GI inflammation does not necessarily confirm IBD that requires immunosuppressive therapy. A small proportion of IBD cases will respond to antibiotics or dietary change, therefore it may be worth performing a diet trial and treatment for ARD first. Of those that don't, it is believed that they have a genetic immune defect. Some of these animals will respond to immunosuppressive treatment but for a small group, no treatment is effective and euthanasia should be discussed.

GI biopsies can be taken either endoscopically (mucosal samples from stomach and upper SI, rectum and descending colon) or by exploratory laparotomy (in which case full thickness biopsies may be taken). There is a significant risk with the latter (12% of dogs died of post-operative complications in a retrospective study of 66 dogs undergoing full thickness biopsies) (Shales et al 2005). Additionally histological interpretation can be challenging (see ACVIM consensus statement of the WSAVA International Gastrointestinal Standardization Group: Washabau et al 2010)

Prior to GI biopsies, a complete work-up should have been performed (see algorithm) including a diet trial. Risks and benefits of the procedure need to be discussed with the owner.

As part of a pragmatic approach to chronic diarrhea, it may be appropriate consider a steroid trial following exclusion of all other diagnoses (as per algorithm) without intestinal biopsies. A full discussion with the owner must take place.

When to consider antibiotics

Antibiotics are rarely indicated in diseases of the GIT.

- Antibiotics are not routinely indicated for vomiting +/- diarrhoea.
- Antibiotics are not indicated just because blood has been seen in the faeces.
- Metronidazole, oxytetracycline, ampicillin or tylosin may be used where antibiotic-responsive diarrhoea (small intestinal bacterial overgrowth) is suspected.
- Metronidazole may be used to treat Giardia, however fenbendazole is the preferred 1st line choice, being both licensed and more effective. *NB in this situation fenbendazole can be supplied without*

charge. Where treatment with fenbendazole alone has been unsuccessful (ie cysts are still present in the faeces), a further course can be combined with metronidazole 25mg/kg BID for 5 days. Remember to bathe affected animals and reduce environmental contamination.

- Only treat specific pathogens (eg Salmonella or Campylobacter) if identified in acute and severe disease. Salmonella is often short-lived and may not require antibiotic therapy. Consider possibility of selecting for resistant strains before using antibiotics in these cases.
- Antibiotics are rarely necessary in haemorrhagic gastroenteritis (there is little evidence for the need to use antibiotics to treat translocation of bacteria across the intestinal wall). However it is justified to use IV antibiotics eg amoxycillin-clavulanate for parvovirus puppies especially if neutropaenic.
- Enrofloxacin may be used if histiocytic ulcerative colitis is diagnosed in a Boxer/FBD. It is important to confirm this diagnosis by colonoscopy and biopsies rather than empirical treatment only as 6-8 weeks are needed.
- Sulfasalazine is an anti-inflammatory and antimicrobial drug often used for the treatment of IBD/colitis in dogs. The exact mode of action is poorly understood and most evidence supporting its use is anecdotal. Development of irreversible KCS is a risk factor. For this reason a STT should be performed prior to and during use. Owners should be made aware of this risk. Some clinicians recommend it is not continued for longer than 10 days. It may be considered if other therapies (diet, fibre supplementation and metronidazole) have been unsuccessful.

Role of fibre

Soluble fibres may be beneficial in cases of idiopathic canine colitis. Soluble fibres have a greater capacity to absorb water and are be highly fermentable. These fibres are rapidly converted by bacteria to short chain fatty acids, the preferred energy source for colonocytes. Supplementation can promote healthy colonic mucosa and immune function, but should be done gradually and incrementally because the ability to absorb water may lead to a worsening of diarrhea if it is added too fast.

Suitable fibres include psyllium ½ tsp to 3tsps per day divided between meals. Alternatively a diet such as Royal Canin fibre response diet may be recommended.

Use of probiotics

Knowledge of the microbiome of the canine and feline gastrointestinal tract is limited. There is some evidence that disturbance of the microbiome is linked with certain gastrointestinal diseases, suggesting that supplementation may be rational. However effective organisms and therefore probiotics are both disease and individual specific; and there is little knowledge of an appropriate dose or duration of administration. (Jugan et al 2017)

Given the lack of evidence **Blue Cross does not supply probiotics for use** however owners may wish to purchase these elsewhere if they wish as they are unlikely to do any harm.

Differential diagnoses

Acute small bowel diarrhoea in dogs and cats:

- Diet
  - Overeating (especially puppies)
  - Dietary change

    - Dietary indiscretion
- Parasites/protozoa
    - Ascarids (*Toxocara* and *Toxascaris* spp.), hookworms
    - *Giardia* spp., Coccidia, *cryptosporidium* spp.
- Infection
    - Viral enteritis – parvovirus, coronavirus, distemper, other viruses (adenovirus, norovirus?)
    - Bacterial enteritis – *Campylobacter* spp., *Salmonella* spp., *E.Coli, Clostridium* spp.
- Toxins
    - Lead, organophosphates, plants
- Unknown – HGE-poss related to *Clostridia perfringens* (increased PCV, normal or low plasma proteins)
- Secondary GI disease
    - Acute pancreatitis
    - Severe systemic disease

Chronic small bowel diarrhoea in dogs and cats

- Diet –diagnosis is usually trial and error, blood tests for anti-food antibodies not specific or clinically useful
    - Diet-responsive disease/food responsive enteropathy- food intolerance (non-immunologcal reaction to a component of food)
    - food allergy/hypersensitivity (immunological reaction to component of food)
- Parasites/protozoa
    - As for acute- see above
- Infection
    - FIP (cats)
- Antibiotic responsive diarrhoea (ARD)- responsive to Abs but no underlying cause identified
- SIBO – usually 2ndary to underlying problem eg. EPI/IBD/motility disorder
- Infiltrative
    - IBD (diarrhoea in dogs, vomiting in cats)
    - PLE
    - Diffuse lymphosarcoma
    - Adenocarcinoma
    - Mast cell tumour (feline)
- Miscellaneous
    - Lymphangiectasia (usually secondary to IBD)
    - Brush border enzyme biochemical defects
    - Cobalamin deficiency
- Secondary GI
    - Motility disorders eg. hyperthyroidism, lead toxicity, dysautoomia
    - Hypoadrenocorticism
    - EPI
    - Hepatobiliary disease
    - Severe systemic disease

Mixed small and large bowel diarrhoea

- Parasites/protozoa
    - Trichuris vulpis (whipworm)

    - Ancylostoma caninum (hookworm)
    - *Giardia* spp. (more commonly small bowel)
    - Tritrichomonas foetus – more commonly large bowel (cats)
    - *Entamoeba* spp
- Infection
    - *Campylobacter* spp.
    - Clostridium perfringens, clostridium difficile
    - *Salmonella* spp
    - Yersinia enterocolitica
    - FIP
- Diet related
    - Food allergy/intolerance
    - Fibre deficiency
    - Passing foreign material
- Inflammatory
    - IBD
    - Lymphocytic –plasmacytic enteritis (colitis)
    - Eosinophilic enteritis (colitis)
    - Histiocytic colitis (boxers) – caused by ebteropathogenic E.Coli, responds to flurquinolones → 6-8wks of enrofloxacin
    - Granulomatous colitis
- Neoplasia
    - Diffuse/focal lymphosarcoma
    - Adenocarcinoma/adenoma
    - MCT
    - Smooth muscle/stromal cell tumours (canine)
- Stress –esp in hospitalised dogs
- Strictures – scar or neoplasm (adenocarcinoma)

References

Jugan, M.C., Rudinsky, A.J., Parker, V.J. et al (2017) Use of probiotics in small animal veterinary medicine *Journal of the American Veterinary Medical Association* **250** (5) 519-28.

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Washabau, R.J., Day, M.J., Willard, M.D. et al (2010) Endoscopic, Biopsy, and Histopathologic Guidelines for the Evaluation of Gastrointestinal Inflammation in Companion Animals. *Journal of Veterinary Internal Medicine* **24** (1) 10-26.

Vomiting and diarrhoea in your dog

Vomiting and diarrhoea are very common symptoms in dogs. Most cases are caused by dogs' habits of eating things they shouldn't whilst out on a walk and signs tend to get better after 24 to 48 hours.

What should I do if my dog has vomiting or diarrhoea?

If your dog is alert, happy and behaving as normal, you may need to do nothing more than take their food away for 24 hours. You may then either offer small amounts of their normal diet or a bland diet of boiled or steamed chicken or white fish (no skin or bones) with some plain boiled white rice. Introduce small amounts first and feed more frequently, gradually building back up to a normal diet. NB it is not advisable to withhold food from young puppies.

When should I worry?

If your dog seems unwell or lacking in energy, particularly if this persists longer than 24 hours you should contact us. It is likely we will suggest you bring your dog to us for examination.

Other situations in which you should call us are:

- Your dog is a puppy, especially if unvaccinated.
- You think (or know) your dog has eaten something they can't digest eg bones, a toy or part of a toy, an item of clothing such as a glove or sock.
- You think your dog has eaten something which may be poisonous eg a plant, medication, or cleaning products.
- There is blood in the vomit or diarrhoea (this may appear as fresh red blood, or old blood which may be dark red or even black in colour).
- There are other symptoms eg collapsing, drinking more, weight loss or coughing.
- You have tried fasting your dog for 24 hours, followed by feeding them a bland diet, but your dog still has symptoms.

Please call us if you are worried

Vomiting and diarrhoea in your cat

Vomiting and diarrhoea are common symptoms in cats. In cats vomiting and diarrhoea may be occasional and have no significance for their overall health.

What should I do if my cat has vomiting or diarrhoea?

If your cat is alert, happy and behaving as normal, you may need to do nothing more than take their food away for 24 hours. You may then either offer small amounts of their normal diet or a bland diet of boiled or steamed chicken or white fish (no skin or bones). Introduce small amounts first and feed more frequently, gradually building back up to a normal diet. NB it is not advisable to withhold food from young kittens.

When should I worry?

If your cat seems unwell or lacking in energy, particularly if this persists longer than 24 hours you should contact us. It is likely we will suggest you bring your cat to us for examination.

Other situations in which you should call us are:

- If your cat is a kitten, especially if unvaccinated.
- You think (or know) your cat has eaten something they can't digest eg small bones, or a thread/string that they have been seen playing with.
- You think your cat has eaten something which may be poisonous eg a plant (for example lillies), or medication.
- There is blood in the vomit or diarrhoea (this may appear as fresh red blood, or old blood which may be dark red or even black in colour).
- There are other symptoms eg weight loss or increased thirst.
- You have tried fasting your cat for 24 hours, followed by a bland diet, but your cat still has symptoms.

Please call us if you are worried

Treatment of epilepsy

(Read in conjunction with supporting notes)

Diagnostic work-up

When an owner presents an animal which has had a possible seizure it is essential to differentiate this from collapse or other episodic event.

- Take a detailed clinical history including detailed description of the seizure (video recording if possible).
- Perform a full clinical examination.
- Take blood for haematology and biochemistry looking for possible causes of a reactive seizure. Request a urine sample from the owner.
- Give clear advice on how to deal with a seizure (owner handout)

Schedule a double appointment 2-3 days later to:

- Discuss the blood results with the owner, test the urine sample.
- Perform a neurological examination.
- Further investigations (eg imaging, blood tests) at Blue Cross to be offered where justified by findings.

Discuss referral for advanced imaging at owners expense if appropriate but as a guide in the following circumstances

- When the age of seizure onset is <6 months or >6 years
- Where there are inter-ictal neurological abnormalities
- *Possibly* when the patient presents with cluster seizures or status epilepticus
- *Possibly* when a previous diagnosis of idiopathic epilepsy has been made but there is resistance to one anti-epileptic drug titrated to the highest effective dose.

Treatment: when to offer it

As a guide, treatment should be initiated in cases where idiopathic epilepsy is suspected when:

- There are 2 or more epileptic seizures within a 6 month period
- The patient presents with cluster seizures or status epilepticus
- The post-ictal signs are severe (e.g. aggression or blindness) or last longer than 24 hours
- The epileptic seizure frequency and/or duration are increasing, and/or seizure severity is worsening over 3 inter-ictal periods.

Prior to starting treatment, owners must be made aware of the commitment involved, the lifelong nature of the condition and potential side-effects of the medication. There must be a discussion of the costs of treatment and the need to make regular contributions. Additionally, dogs with epilepsy have an increased risk of behavioural changes and 20-30% of dogs will remain poorly

controlled despite the use of multiple agents.

Treatments available (dogs)

Phenobarbital is our first-line treatment.

- Oral starting dose is 2-3.5mg/kg BID
- Check serum levels 2 weeks after starting or changing the dose (specific timing with respect to tablet not necessary). May also be worth checking serum level prior to changing the dose if >1 year since checked (provides a baseline).
- If seizure control is inadequate, dose can be increased up to 6mg/kg BID as long as serum levels are within recommended parameters.
- CI in dogs with hepatic dysfunction

Potassium Bromide can be added if maximal dosing (within the therapeutic range) has been achieved with phenobarbital and seizure control is deemed inadequate. Or as a first-line treatment (monotherapy) for animals with hepatic dysfunction.

- Starting dose is 20-30mg/kg SID with food.
- Check serum levels 3-4 months after starting or changing the dose.
- Where used as a monotherapy the starting dose is 30-40mg/kg SID.
- Avoid in cats

Imepitoin (Pexion) can be offered if phenobarbital has not been tolerated. The advantages are that serum level monitoring is not required and it is not regarded as being hepatotoxic, however there is little evidence that it is more effective than phenobarbital and many neurologists choose phenobarbital preferentially.

- Starting dose 10mg/kg BID (dose range 10-30mg/kg BID)
- Bioavailability is greater when administered to fasted dogs. The timing of tablet administration in relation to feeding should be kept constant
- CI severe hepatic, renal or cardiovascular dysfunction.
- Aggression has been associated with its use.
- Not suitable for breeding animals.

Levetiracetam (Keppra) (Off label) is extremely expensive and can only be offered as long-term management by prescription at owner's expense.

- The usual starting dose is 20-30mg/kg TID
- Few adverse effects, transient sedation mainly
- Useful in cats
- See below for use in cluster seizures/status epilepticus

Diet: Purina Pro Plan NC NeuroCare is a diet rich in MCTs, antioxidants and B vitamins which can help control seizures and behavioural changes. Available at owner's expense.

Treatments available (cats)	**Phenobarbital (off label)** is our first-line treatment. • Oral starting dose is 1.5-3mg/kg BID • Monitor as for dogs **Levetiracetam (Keppra) (off label)** can be offered (by prescription at owner's expense) if control is inadequate with phenobarbital • The usual starting dose is 20-30mg/kg TID • Mild sedation is the main side effect
Treatment of status epilepticus	**Diazepam** (0.5mg/kg i.v. or 1-2mg/kg per rectum) or **midazolam** (0.1-0.3mg/kg i.v. or intranasally). Repeat up to 3x. *NB midazolam preferred in cats.* **Phenobarbital** 12mg/kg slow i.v. loading dose. Two further doses 4-6mg/kg i.v. at 20 min intervals if needed (max dose 18-24mg/kg). *If already on phenobarbital take a blood sample to assess current serum level prior to giving a one-off top-up bolus of 4-6 mg/kg i.v.* **Propofol CRI** is costly and requires intensive monitoring. It may be considered when the above measures have proved unsuccessful, however where the prognosis is felt to be poor or where operationally difficult to perform euthanasia is likely to be preferable. 24 hours max, wean off over a further 24 hours. **Levetiracetam** can be used in a case where there are periods of consciousness (during which the animal can safely be given oral medication) as follows: 60mg/kg loading dose p.o., followed by 30mg/kg TID for up to a maximum of 3 days. This regime can also be used to gain control of cluster seizures. ***Levetiracetam should not be continued beyond 3 days, however if longer term treatment is desired a prescription can be supplied. Hospitals can stock a limited supply of Levetiracetam liquid and 500mg tablets for emergency use (ie not on the dispensary shelves)*** See supporting notes for mention of Dexdomitor/Domitor
Ongoing management	• For stable cases check up every 6 months. • Monitor haematology and liver enzymes every 6-12 months where phenobarbital is prescribed. • Monitor phenobarbital levels only where control is poor or toxicity suspected.

When to consider euthanasia	*Sadly many of these cases can prove challenging to manage and remain a huge source of distress to both owner and pet. In the following cases especially, euthanasia should be discussed.* • Poor owner compliance or where an owner feels unable to cope. • Where the occurrence of seizures poses particular risk/distress for owners eg elderly or frail owners, presence of young children. • Seizures not adequately controlled on multiple drugs at maximum doses. • Unacceptable side effects of drugs. • Comorbidities, terminal diagnosis eg brain tumour. • Undesirable behaviour changes due to the disease or drugs.
Owner Support	Handout: *Epilepsy in dogs and cats.* *Owners must have clear advice on what to do in the event of a seizure, including emergency telephone numbers* Off-label consent form to be signed where off-label meds are used.
Audit and Governance	• Ensure good owner compliance. Untreated or poorly treated seizures will have a significant negative impact on QOL • Report any suspected adverse reactions to VMD. • Follow up appointments with the same vet where possible. • These cases are likely to be good to share in clinical governance sessions.

Treatment of epilepsy

(Read in conjunction with guideline)

Epilepsy is not a single disease but a collection of conditions with a wide range of underlying aetiologies and pathologies resulting in recurrent seizures.

Classification of seizures

Seizures can be classified according to ***cause***.

Reactive Seizures

These are seizures usually caused by metabolic disorders or intoxication and result in a response from the normal brain to transient disturbance in function. They are usually reversible when the underlying cause or insult is addressed.

Idiopathic Epilepsy

- Genetic epilepsy- where there is a known causative gene in a certain breed eg Lagotto Romagnolo
- Suspected Genetic Epilepsy- a genetic influence is believed to be present supported by a high breed prevalence eg collie
- Idiopathic Epilepsy – where the cause is unknown; ie no evidence of metabolic or toxic disturbances, or of structural epilepsy.

Structural Epilepsy

Usually caused by intracranial pathology including vascular, inflammatory, infectious, anomalous, neoplastic and degenerative conditions.

Seizures can also be classified according to ***how they manifest***:

Focal Seizures

Result from activation of a single location in the cerebral hemisphere; they are called complex focal seizures when consciousness is affected.

Generalised seizures

Result from activation of both cerebral hemispheres simultaneously; usually the dog or cat presents with immediate convulsions and loss of consciousness.

The Veterinary Epilepsy Task Force (IVETF), a group of 26 veterinary practitioners, neuropharmacology, neuropathology and neurology experts from around the world came together in 2015 to produce 7 consensus statements regarding the definitions involving classification, diagnosis and treatment of epilepsy.

http://www.rvc.ac.uk/news-and-events/press-office/veterinary-neurology-experts-global-consensus-on-epilepsy

Prior to the above classifications there was a large variety in the terminology used to describe seizures, making it more difficult for veterinary professionals to communicate effectively.

At Blue Cross we should all try to use the above classifications/descriptions of seizures in our notes for consistency and understanding between colleagues.

International Veterinary Epilepsy Task Force consensus report on epilepsy definition, classification and terminology in companion animals (chaired by Prof. Mette Berendt).
http://doi.org/10.1186/s12917-015-0461-2

Diagnostic work-up

Clinical History

A full history from the owner is essential; including a detailed description of the seizure, how long it lasted for, when it occurred, whether there were any unusual signs of unusual behavior or a stimulus prior to the seizure, and what happened after the seizure.

It is very important to clarify that it is a seizure that has occurred and not another type of paroxysmal event that has resulted in a similar presentation (such as a movement disorder, narcolepsy, cataplexy, or sleep disorder). It is also important to establish that it was not an episode of collapse or syncope which may have a completely different underlying cause e.g. cardiovascular disease.

Seizures most commonly occur at rest or during sleep. They are usually short and typically post-ictal signs such as hunger, thirst, ataxia, pacing and restlessness can be identified.

It is a good idea to encourage the owner to obtain video footage of the seizure when it occurs.

It is also necessary to ask the following:

- Has the animal has ever had a seizure prior to this event?
- Has the animal been exposed to any possible toxins?
- Is there a history of any other illnesses that could lead to metabolic changes that may cause a seizure?

Clinical Examination

A full clinical examination along with a neurological exam should be performed in all cases.

It may be appropriate to delay the neurological examination a couple of days if an animal is presented immediately post seizure as stress and post-ictal signs may confuse the results.

Laboratory Tests

Full haematology, biochemistry (including electrolytes, glucose, fasting bile acids) and urinalysis should be performed in all cases after the first seizure to rule out reactive seizures and help identify any pre-existing disease, such as liver disease; which may affect the choice of anti-epileptic drugs (AEDs) for the patient.

Routine 6 monthly laboratory tests are recommended by the manufacturers of all AEDs to screen for signs of toxicity and so establishing a base-line is important.

X-rays

Imaging of the thorax and abdomen to look for a primary neoplasm could be considered where metastatic disease as a cause of seizures is suspected. This may aid diagnosis and prognosis, however if unlikely to make a difference to treatment options or decisions, a trial of medications could be considered without imaging first.

MRI and CSF

These treatments are both outside of the scope of service of the Blue Cross however referral at the owner's expense may be offered. As many of our clients are limited financially, it is worth considering in which cases advanced imaging is more likely to be relevant and helpful.

The International Veterinary Epilepsy task forces (IVETF) consensus statement on diagnostics is based on the review of many studies in the incidence of structural and idiopathic epilepsy and their diagnosis with MRI or CSF analysis. It suggests that these diagnostics should be considered in the following cases:

- The age of seizure onset is less than 6 months or more than 6 years.
- There are inter-ictal neurological abnormalities.
- The patient has presented with cluster seizures or in status epilepticus.
- A previous diagnosis of Idiopathic epilepsy has been made, but there is drug resistance to at least one anti-epileptic drug titrated to the highest effective dose.

It is important to note that whilst advanced imaging may help with diagnosis and prognosis, it may not increase treatment options.

When to start treatment

The IVETF consensus statement on medical management suggests initiating treatment when:

- There is an interictal period of less than or equal to 6 months (i.e. 2 or more epileptic seizures within a 6-month period) *(NB if seizures are brief and the owner is coping, it may be appropriate to hold off treatment at this stage)*
- The animal presented in status epilepticus or with cluster seizures
- The post ictal signs are considered especially severe (e.g. signs of aggression, blindness) or they last longer than 24 hours.

- The epileptic seizure frequency and/or duration are increasing and/or the seizure severity is worsening over 3 interictal periods.

International Veterinary Epilepsy Task Force Consensus Proposal: Diagnostic approach to epilepsy in dogs (Chaired by Drs. Luisa De Risio and Sofie Bhatti) http://doi.org/10.1186/s12917-015-0462-1

Prior to starting treatment it is extremely important to have a conversation with the owner to ensure they are fully aware of the implications of the diagnosis and the potential side effects and of the medications to be used.

Please include the following in your discussion:

- Once medication is initiated it will most likely be on lifelong.
- The client needs to be aware that medical therapy is a commitment; there will be a need to attend regular follow up appointments for examination and blood tests.
- The ongoing costs of treatment and monitoring and the need to make regular contributions
- They should also be made aware that dogs with epilepsy have an increased risk of developing behavioural changes.
- Unfortunately many dogs diagnosed with epilepsy have an increased risk of early death.
- Approximately 20-30% of dogs will remain poorly controlled despite the use of polytherapy.

If an owner is not prepared for the commitment or is finding it difficult to cope, then a decision of euthanasia may need to be considered.

Medical treatment

International Veterinary Epilepsy Task Force consensus proposal: Medical treatment of canine epilepsy in Europe (Chaired by Drs. Sofie Bhatti and Luisa De Risio) http://doi.org/10.1186/s12917-015-0464-z

Phenobarbital (Dogs and cats)

- Enhances the inhibitory processes facilitated by GABA.
- Seems to be effective in decreasing seizure frequency in approximately 60–93 % of dogs with idiopathic epilepsy when plasma concentrations are maintained within the therapeutic range of 25–35 mg/l (Boothe et al 2012; Farnbach 1984; Morton & Honhold 1988; Schwartz-Porsche et al 1985)

NB The high chance of control with phenobarbital alone is very important point as there have been cases at Blue Cross where a second AED was added into an animal's treatment without

checking serum phenobarbital levels and where there was a possibility to increase the dosage of phenobarbital prior to adding in a second AED.

- The recommended oral starting dose is 2-3.5mg/kg BID however it can be given at up to 6mg/kg as long as serum levels are within the recommended parameters.
- It reaches a steady-state in 10-14 days and so it is recommended to check serum levels 2 weeks after the start of treatment and adjust the dose accordingly.
- It causes increased in ALT, ALP and GGT due to liver enzyme induction.
- It is contraindicated in dogs with hepatic dysfunction.
- A dog with adequate seizure control, but serum phenobarbital concentrations below the reported therapeutic range, does not require alteration of the drug dose, as this serum concentration may be sufficient for that individual.
- The most common adverse effects reported by clients when phenobarbital is initially started, or when the dose has been increased, are PU/PD, polyphagia, sedation, and ataxia. These are all transient and tend to disappear as tolerance develops.
- Other less common adverse effects include hepatotoxicity and blood dyscrasias (neutropaenia, anaemia, thrombocytopaenia). These are usually reversible once phenobarbital treatment is stopped.
- Checking biochemistry, haematology and serum concentrations of phenobarbital are generally recommended every 6-12 months. At Blue Cross we will check liver enzymes every 6-12 months, however serum phenobarbital level need only be checked where seizures are uncontrolled or toxicity is a concern.
- Where liver enzymes are significantly elevated, a bile acid stim test should be performed to evaluate liver function.
- ***First-line treatment at Blue Cross where not contraindicated.***

Potassium Bromide (Dogs only)

- The exact mechanism of Bromide is incompletely understood. It is thought to involve chloride ion channels in the inhibitory network of the central nervous system.
- It is filtered at the glomerulus and then reabsorbed by the kidneys in competition with chloride. Therefore, changes in the diet that may alter the chloride intake could affect bromide elimination. Owners should be advised to keep their dog on the same diet, discussing any potential diet change with us prior to making it as it may affect stability.
- The usual starting dosage is 20-30mg/kg SID with food if used as polytherapy; or 30-40mg/ml where used as monotherapy.
- Can be used as monotherapy in animals with hepatic disease It could also be considered as a monotherapy in cases where owner compliance is a concern as it is given once daily.
- A recent study showed that both phenobarbital and bromide were reasonable first-choice AEDs for dogs, but phenobarbital was more effective and better tolerated during the first 6 months of treatment. Phenobarbital resulted in eradication of seizures in 85% or dogs treated with it compared with those treated with bromide as a monotherapy of which on 52% had eradication of seizures (Boothe et al 2012)

- It can take 2.5-3months to reach a steady sate in the blood. Monitoring serum levels should be done 1-3 months after starting therapy (the blood can be taken at any time during the day).
- If the animal is suffering from severe or cluster seizures a loading dose can be give of 40mg/kg TID for 3-5 days. However, it is advisable to hospitalize the animal during this time so it may be difficult to manage at Blue Cross
- Adverse effects include sedation, ataxia, weakness, PU/PD, and polyphagia; as with phenobarbital, these signs are usually transient and subside, either partially or completely when steady state concentrations in the blood are reached.
- Nausea and vomiting (due to direct gastric irritation) can also occur. It is advisable to avoid in dogs with pancreatitis. Giving the potassium bromide in liquid form and with food can reduce the likelihood of GI signs.
- Coughing and allergic pneumonitis have been reported in cats. Do not use.
- Bromism is a condition where stupor/coma, disorientation, ataxia, paresis, blindness and dysphagia occur as an adverse effect of KBr. It is usually due to dietary changes 1-2 weeks before. It is recommended to stop the bromide for a few days and then restarted at a lower dose. In severe cases, it may be necessary to give iv NaCl slowly.
- ***To be used as second-line add-on treatment for dogs which remain inadequately controlled on phenobarbital at the maximum dose (6mg/kg BID)***.

Imepitoin (*Pexion*) (Dogs only)

- Low affinity partial agonist of GABA receptors.
- No tolerance or dependence found.
- Quicker onset of action than phenobarbital/KBR. Plasma levels observed within 30 minutes; peak plasma levels reached within 2-3 hours.
- Dose: 10-30mg/kg BID with no benefit of increasing the drug beyond this range.
- Bioavailability is greater when administered to fasted dogs. The timing of tablet administration in relation to feeding should be kept consistent.
- Plasma level monitoring is not necessary.
- Less severe and more short-lived side effects than other antiepileptic drugs and no hepatic toxicity reported.
- Adverse effects where seen include PU/PD, polyphagia, somnolence/sedation or transient hyperexcitability, hypersalivation, vomiting, change in behavior, anorexia and diarrhea. Aggression has been associated with its use.
- Contra-indicated where there is severe hepatic, renal or cardiac dysfunction.
- Contra-indicated in breeding animals
- There is little evidence that it is more effective than phenobarbital and many neurologists choose phenobarbital preferentially.
  A study comparing the efficacy of imepitoin with phenobarbital, along with the occurrence of adverse effects reported with each drug concluded that the majority of dogs with idiopathic epilepsy were managed successfully with imepitoin with no significant difference of efficacy between imepitoin and phenobarbital. (Tipold et al 2015).
  The frequency of adverse events (e.g. sedation, polydipsia, polyphagia) was significantly higher in the phenobarbital group. It is worth noting however that many of the people involved in this study were employed by Boerhinger. Additionally, examining the study in

more detail, phenobarbital did actually seem more successful in treating idiopathic epilepsy overall, albeit the results were not hugely different. It is also worth noting that the number of animals that had to stop each treatment due to significant adverse effects was equal in both the phenobarbital and Imepetoin groups. Most of the adverse effects of phenobarbital are transient and resolve when steady state is achieved.

- ***Imepitoin should not be considered a first line AED at Blue Cross but may be considered where phenobarbital causes intolerable side effects or affects liver function. Whilst it can be added to phenobarbital/KBr where seizure control has been inadequate, studies have demonstrated the effect is minimal and this would represent a significant increase in cost to us so is beyond our scope of service.***

Levetiracetam (*Keppra*) (Dogs and cats)

- The exact mechanism of action of levetiracetam is unknown.
- It usually started at 20-30mg/kg TID. (higher-end of the range may need to be considered if they are on phenobarbital as the latter may reduce levetiracetam levels slightly)
- A loading dose of 60mg/kg iv can be used to treat status epilepticus (not available at Blue Cross).
- Can be used as pulse therapy at 30mg/kg for 3 days in an animal having cluster seizures.
- It has very few adverse effects with transient sedation being the main one reported.
- It is very useful in cats with only mild sedation and decreased appetite reported as adverse effects.
- It is available as a tablet and syrup orally and an injection for IV use. The injectable form is not currently available at the Blue Cross.
- A "honeymoon effect" has been reported in studies suggesting that its efficacy can wear off after several months.
- In a recent review of the treatment of canine epilepsy there was evidence for both the use of Potassium Bromide and Leviteracetum as an adjunct therapy when used with Phenobarbital for the control of seizures. However it was also concluded there was insufficient evidence to suggest which medication is superior as an AED (Charalambous 2014).

- ***This drug is very expensive (see pricings at the end) and is beyond the scope of Blue Cross. A prescription can be supplied for the owner to obtain this drug at their own expense. It is acceptable for a Blue Cross hospital to maintain a small stock of Keppra liquid and 500mg tablets for short term use (3 days) in the event of cluster seizures or periods of status epilepticus where there is enough of a recovery to be able to take oral medication***.

Diet: *Purina Pro Plan NC NeuroCare*

Available from January 2018, this diet is rich in MCTs, antioxidants and B vitamins. It has been shown to reduce seizure frequency in up to 71% of dogs which were also being treated with AEDs. It can also help manage behavioural signs eg anxiety and ADHD.

Emergency management of seizures

In an emergency situation fast-acting drugs should be used to achieve seizure control as quickly as possible; often IV formulations are necessary as these patients are unconscious.
For an animal that is not on seizure medication presenting in status epilepticus or with cluster seizures for the first time, follow the regime below:

- Diazepam (0.5m/kg IV or 1-2mg/kg per rectum) or Midazolam (0.1-0.3mg/kg IV). Both of these can be repeated up to 3 times. *Note the higher dose of diazepam when administered rectally.*

If inadequate response

- Phenobarbital IV; start with a loading dose of 12mg/kg slow iv, then if required, two further doses of 4-6mg/kg iv at 20 minute intervals to a maximum of 18-24mg/kg. If the animal has previously been on phenobarbital medication it is advisable to try and get a blood sample to check phenobarbital levels to assess blood levels prior to administration of iv phenobarbital. Then give a one-off, top up bolus of 4-6mg/kg iv.

If the response is still inadequate, consider the likely diagnosis and prognosis and consider a euthanasia decision on welfare grounds. A propofol CRI can be considered if resources exist to administer and monitor the patient appropriately and following evaluation of likely prognosis/owner commitment/QOL.

- Proprofol CRI*
  - 1-3.5mg/kg bolus (can repeat to effect) then 0.01-0.25mg/kg/min for 6-12 hours before slowly tapering over 12-24hours.
  - Propofol infusion can be continued for up to 48 hours if seizures recommence as it is tapered.
  - Beware of Heinz body non-haemolytic anaemia in cats – use the lowest dose for the shortest time.

- Dexmedetomidine can be considered as an alternative to propofol infusion. Also useful where iv access cannot be gained.*
  - Give 375mcg/m^2 i/m. This can be topped up to a maximum of 500mcg/m^2 in the dog or 40mg/kg in the cat.
  - Aim for light to moderate sedation; palpebral and gag reflexes should be present, but unable to lift head.

- Sedation can be topped up when the animal is beginning to lift the head. Sedation advised for 12-24 hours.

** Dosages derived from Clare Rusbridge notes.*

Monitoring during propofol/dexmedetomidine sedation

- Monitor temperature every 2 hours. If hyperthermic due to seizure activity can treat with NSAIDs.
- HR/PR – partial reversal of dexmedetomine if <40bpm
- Mental status/responsiveness/PLR/pupil size/eye position
- Consider PaO2 monitoring. Give O2 and partial reversal if <95%.
- Turn every 4 hours.
- Maintain hydration status

In certain cases where the animal is having periods of consciousness between seizures and they are still able to eat; a short course of levetiracetam can be given at 30mg/kg TID for 48-72 hours. ***However this must not be continued longer unless by prescription at the owner's expense.***

If after all these treatments have been given and they animal is still suffering from seizures then euthanasia should be strongly recommended on welfare/prognosis grounds.

Seizures in cats

Cats frequently have complex focal seizures with or without secondary generalization.Signs include facial twitching, tremors, rapid running, mydriasis, hypersalivation, urination or defecation.

Long-term Treatment:

Phenobarbital as a first line at a starting dose of 1.5-3mg/kg p.o. q12hrs. Monitoring as for dogs.

Levetiracetam (by prescription only at owner's expense) can be considered as a second line at a dosage of 10-30mg/kg p.o. q8-12 hours.

Potassium Bromide should NOT be given to cats as it causes coughing and allergic pneumonitis.

Emergency Treatment:

Midazolam should be chosen as a first line due to the risk of fulminant hepatic necrosis with repeated diazepam treatment in cats.

Drug	5kg Monthly costs	10kg	20kg
Phenobarbital 2mg/kg BID	Epiphen sol 0.25ml BID = £6.30 Phenoleptil 12.5mg (2.5mg/kg) BID = £3.00	Epiphen sol 0.5ml BID = £12.30 Epiphen 30mg BID (3mg/kg) = £6.00 Phenoleptil 50mg (2.5mg/kg) 0.5 BID = £3.00	Epiphen 60mg BID (3mg/kg) = £12.00 Phenoleptil 50mg (2.5mg/kg) BID = £6.00
Potassium Bromide 20mg/kg SID	-	Libromide 325mg 0.5 SID (16mg/kg) = £3.60 1 SID (32.5mg/kg) = £7.20	Libromide 325 SID (16mg/kg) = £7.20 1.5 SID (24mg/kg) = £10.80
Levetiracetam 20mg/kg TID	Keppra oral 100mg/ml 1ml TID = £28.80 Keppra 250mg ½ TID (25mg/kg/TID) = £38.70	Keppra oral 2ml TID = £57.60 Keppra 500mg ½ TID (25mg/kg TID) = £66.60	Keppra oral 4ml TID = £115.20 Keppra 500mg TID (25mg/kg TID) = £133.20
Leteracetam pulse 30mg/kg ?TID x 3 days	Keppra oral 1.5ml TID x 3d = £4.32	Keppra oral 3ml TID x 3d = £8.64	Keppra oral 6ml TID x 3d = £17.28
Imepitoin 10mg/kg BID	Pexion 100mg ½ BID = £6.60	Pexion 100mg BID = £13.20	Pexion 400mg ½ BID = £12.90
Propofol infusion 4mg/kg/hr x 24 hours	Propoflo 10mg/ml = £10.66	= £21.32	= £42.64

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Epilepsy and Seizures

Abnormalities of the brain can result in seizures (or 'fits'). Such abnormalities include epilepsy, infections, head trauma, blood clots or bleeds; or poor functioning of internal organs which leads to a build-up of waste products or toxins in the blood affecting the brain.

What does a seizure look like?

A severe seizure will involve loss of awareness, collapse and violent uncontrolled movements of the legs, jaw and head. Your pet may pass urine and faeces. This is sometimes referred to as a generalised seizure or 'grand mal'.

Seizures can also be very mild, sometimes involving remaining still and staring for a few moments, or milder movements in one leg or the jaw. This type of seizure is sometimes referred to as partial, or 'petit mal'.

What should I do if my pet has a seizure?

It is very important to stay calm. Turn off lights and TV/radio. Try to ensure your pet does not injure themselves by padding the area with cushions and towels but **DO NOT BE TEMPTED TO TRY AND PICK THEM UP OR RESTRAIN THEM.** This may prolong the seizure and you may be badly bitten by them as they are not aware of their surroundings and are not able to control their movements and reactions. Similarly, do not try and put anything in their mouth, or rescue their tongue to avoid it being swallowed. After the seizure, your pet may be disorientated, wobbly and 'not themselves' for a while. If this is your pets fist seizure you should call us for an appointment.

Most seizures are brief (only a few minutes) although it may feel like a very long time! If a seizure is continuing for more than 5 minutes, or if your pet has a cluster of seizures close together (within 24 hours), this is a medical emergency and you must call us for advice straight away.

What investigations will be done?

The vet will take a detailed description of the seizure. Sometimes it can be hard to tell if a pet has had a seizure, or had another type of collapse, so we may ask you a lot of questions. If you are able to film the seizure on your phone to show us – that can be really helpful.

The vet will need to examine your pet carefully.

The vet may take blood samples and ask you to collect a urine sample.

In some cases X-rays may be recommended

Treatment and prognosis (outlook) will vary depending on the underlying diagnosis.

What is epilepsy and how is it treated?

Epilepsy is a cause of recurrent seizures. In some cases it is believed to be inherited. There is no specific test, but your vet will suspect epilepsy where other causes of seizures have been ruled out, taking into account the age and breed of your pet.

Antiepileptic drugs (AEDs) may be prescribed. However it is important to keep in mind the following points.

- ✓ This is usually **lifelong treatment** and is a big commitment for you as an owner. The aim is to manage the symptoms as a cure is not possible.
- ✓ **Some dogs will not respond to AEDs** (up to 1/3rd of dogs with epilepsy)
- ✓ **AEDs have side-effects** (see below). Treatment does not aim to eradicate seizures, but to reduce the frequency, severity and length of seizures whilst minimising side-effects.
- ✓ It is important to **give AEDs as directed** and at regular intervals (eg if twice daily, this means 12 hours apart)
- ✓ You will need to **attend regular check-up appointments** for examination and sometimes blood tests.
- ✓ **Keep a diary** of seizures including the date and time of the seizure, how long it lasted and what happened.
- ✓ **Keep the emergency telephone number** of your hospital accessible and have a means of transporting your pet to the hospital in an emergency.

The two most common medications we currently prescribe are:

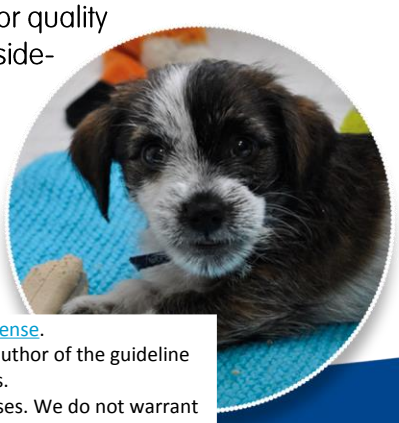
Phenobarbital (dogs and cats). This is usually given twice daily (ie 12 hours apart). The most common side-effects are increased thirst and appetite, wobbliness, and sedation. These symptoms tend to disappear with continued use over 2-3 weeks. Phenobarbital may affect the liver and the blood cells, so we will need to occasionally perform blood tests to monitor for this.

Potassium Bromide (dogs only). This is often given as an additional medication in dogs which have not been controlled by phenobarbital. In some cases it is given on its own without phenobarbital. It is usually given once daily with food. It is very important to keep your dog's diet constant whilst on this medication. Discuss any changes of diet in advance with your vet. Side-effects are similar to phenobarbital and will usually disappear over time. In some cases it may cause vomiting.

Never stop anticonvulsant medication suddenly

It is very sad, but important to know, that some pets with epilepsy have a poor quality of life, either because their seizures cannot be controlled, they suffer severe side-effects from the medication. Some epileptic dogs may develop undesirable behaviours over time which are hard to treat.

In these cases we sometimes need to consider a euthanasia decision.



If you have any further questions please ask us