

Formulary

Sections:

- Dog formulary
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- Fluid therapy and blood transfusions

The following is a basic list of medications often used at small animal veterinary field clinics, with typical dosages and is written in lay terms. Commonly used trade names (with generic) for some drugs are used, whereas other medications are listed as generics only. Some medications have wide dose ranges while others do not and have very little safety margin. All drugs have side effects and contraindications to their use, but those listed here are included specifically since the benefits to their rational use exceed the risks. It is further assumed that anyone with access to these drugs is using them under the direction of a licensed veterinarian, and that personnel are trained in how to safely and aseptically administer injectable medications. However, anesthetics are not included in the following list since their use carries significantly higher risk and should only be used by trained personnel with appropriate monitoring equipment and experience..

There are entire books available with significantly more information on each drug, adverse effects, various usages and dosages, etc. and it is highly advised to keep a copy of these books (e.g. Plumb's Veterinary Drug Handbook, Papich Handbook of Veterinary Drugs) on hand for immediate consultation.

Unlike fluid therapy (subcutaneous fluid therapy is typically dosed by pounds of body weight in the United States), all drugs are listed in mg/kg format. I.e., drugs are listed as milligrams of drug per kilogram of body weight, with kilogram of body weight calculated by taking weight in pounds and dividing by 2.2. It is crucial that all body weights be converted to kilograms for drug calculations, and that all staff administering drugs be familiar with basic calculations and be using the same metric (kilograms). If a drug is accidentally calculated using pounds of body weight instead of kilograms, the patient will receive over twice the correct dose.

As an example of how to calculate a dosage, let's imagine that we have a 33 pound (#) dog that we would like to start on enrofloxacin (an antibiotic). Calculating the body weight in kilograms for this dog is $33\# / 2.2 = 15\text{kg}$. Enrofloxacin is typically given at 10 mg/kg once daily, therefore this dog that weighs 33 pounds (15kg) would receive 150 mg (i.e. $10 \text{ mg/kg} \times 15 \text{ kg}$) of enrofloxacin once daily. Enrofloxacin typically comes in 22.7 mg tablets, 68 mg tablets, and 132 mg tablets. If you have 22.7 mg tablets on hand, and need 150 mg total, you therefore need $150/22.7$, or 6.6 tablets. Rounding up or down (7 vs 6.5 tablets) is a matter of clinical judgment and listed dose range (if applicable).

Injectable medications listed below are supplied in mg/ml, the number of milligrams of medication per milliliter (or cc) of fluid. If the above dog weighing 15kg were to receive injectable enrofloxacin at the same dose of 10 mg/kg, they would still receive 150mg. The small animal (dog and cat) version of injectable enrofloxacin is supplied at 22.7 mg/ml, so the example dog would receive 6.6ml (i.e. $150 \text{ mg} / 22.7 \text{ mg/ml}$). However, in order to save on expense, many field clinics use the much more concentrated large animal version of enrofloxacin which is supplied at 100 mg/ml. Using this version, our example dog would receive 1.5ml (i.e. $150 \text{ mg} / 100 \text{ mg/ml}$).

Given that many oral and injectable medications are supplied at different strengths, it is therefore imperative that staff double check dosages and ensure that they are giving the correct medication, at the correct dose for body weight in kg, and that all calculations take into account the strength in mg of the drugs supplied. If multiple strengths of injectable drugs are available at the same clinic, it is recommended to only have one known strength available for use, in order to avoid potential over or under dosing.

Finally, in the interest of making things as simple as possible, pharmaceutical abbreviations are not used in the following list. The only exceptions are the self explanatory: SQ (subcutaneous), IM (intramuscular), and IV (intravenous). Injectable medications in the following list may not list the full course (e.g. one week, etc.) since in many cases it may be an initial injection to be followed by the oral version or a comparable oral medication from the same drug class.

Dog Formulary

Soft tissue infections (bite wounds, trauma, urinary tract infections, etc.):

Amoxicillin: 20 mg/kg by mouth every 8-12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections.

Ampicillin: 20-30 mg/kg by mouth, SQ, IM, or slow IV (over 15 minutes) every 8-12 hours for 7-14 days (or until can be switched to oral ampicillin, oral Clavamox, or oral amoxicillin).

Cefazolin: 22-30 mg/kg SC, IM, or IV every 8 hours for 7-14 days (or until can be switched to oral cephalexin or oral cefpodoxime).

Cefpodoxime: 5–10 mg/kg by mouth every 24 hours for 7-14 days.

Cephalexin: 25 mg/kg by mouth every 8 hours for 7-14 days. Most commonly used for dermal infections but can be used for other soft tissue as well as dental infections.

Ciprofloxacin: 30 mg/kg by mouth once a day for 7 days. Most commonly used as a cheaper alternative to enrofloxacin.

Clavamox (amoxicillin/clavulanic acid): 13.75 mg/kg by mouth every 12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental and orthopedic infections. Broader spectrum than amoxicillin but typically more expensive.

Enrofloxacin: 10 mg/kg by mouth or subcutaneously once a day for 7 days. If given as an injection, dilute with an equal volume of sterile saline. *Enrofloxacin should not be used in a dehydrated animal or one with kidney disease, and as such the animal should be eating and not vomiting.*

Metronidazole: 15-22 mg/kg by mouth every 12 hours for 5-7 days. Less commonly used at 10 mg/kg slow IV (over 15 minutes) every 8 hours, in combination with other antibiotics in septic patients and those unable to take oral meds, such as parvoviral cases. Soft tissue antibiotic specifically used for anaerobic infections.

Penicillin Procaine: 30 mg/kg SQ once daily for 5 days. Some labels use IU/ml instead of mg/ml, in which case the appropriate dosage is 20,000–40,000 IU/kg SC. Use a new injection site each day.

Orthopedic infections:

Cefazolin: 22 mg/kg SC, IM, or IV every 8 hours (or until can be switched to oral cephalexin or oral cefpodoxime).

Cephalexin: 25 mg/kg by mouth every 8 hours for 30-45 days.

Clavamox (amoxicillin/clavulanic acid): 13.75 mg/kg by mouth every 12 hours for 7-30 days. Most commonly used for soft tissue infections but can be used with dental and orthopedic infections. Broader spectrum than amoxicillin but typically more expensive.

Respiratory infections:

Amoxicillin: 20 mg/kg by mouth every 8-12 hours for 7-30 days.

Ampicillin: 20-30 mg/kg by mouth, SQ, IM, or slow IV (over 15 minutes) every 8-12 hours for 7-30 days (or until can be switched to oral ampicillin, oral Clavamox or oral amoxicillin).

Clavamox (amoxicillin/clavulanic acid): 13.75 mg/kg by mouth every 12 hours for 7-30 days. Most commonly used for soft tissue infections but can be used with dental and orthopedic infections. Broader spectrum than amoxicillin but typically more expensive.

Doxycycline: 10 mg/kg by mouth every 12 hours for 7-28 days.

Anti-vomiting / anti-nausea medication:

Cerenia (maropitant): 2 mg/kg by mouth every 24 hours, or 1 mg / kg SQ or IV every 24 hours. Maximum of 5 days.

Metoclopramide: 0.5 mg/kg by mouth, IM, or IV every 8 hours. *Cannot be used if there is the risk of a gastrointestinal foreign object.*

Ondansetron: 0.4–1 mg/kg by mouth, SQ, or IV every 12 hours.

Tick borne infection (Rickettsial, Ehrlichia, etc.):

Doxycycline: 10 mg/kg by mouth every 12 hours for 28 days.

Minocycline: 12 mg/kg by mouth every 12 hours for 21 days.

Mange treatment (Demodex, Sarcoptes) / Flea / Tick:

Numerous flea and tick medications are commonly available, both prescription and over-the-counter. Additionally, many dermal flea and tick medications given off-label will successfully treat mange as well as species of Spinose ear ticks. The off-label status for mange is typically because these products are marketed towards more common flea and tick issues in richer non-Third World areas where mange is rare. As such, manufacturers have not invested the time and money required in testing to prove for marketing label purposes that the products also treat the parasites that cause mange. However, as confirmed in published independent studies, these medications do in fact treat the skin parasites that cause mange.

Many options exist. Fluralaner, afoxolaner, sarolaner, or lotilaner given for 2-3 successive months (or one single dose if a 3 month version is used) will successfully treat mange.

Follow label instructions as to frequency and the appropriate dosage for body weight. Labels will state minimum age of use, but certain medications are safe for use at ages younger than label indications. E.g. The label for Bravecto (fluralaner) states only for use in dogs 6 months of age or older, but in studies no clinically relevant problems were noted in puppies 8 weeks of age and older receiving this medication at 5X the labeled dose.

Additionally, there is variability in labeled minimum age in different countries. E.g. Simparica (sarolaner) is labeled in the United States for use at 6 months and older, but in Europe is labeled as safe for use at 8 weeks and older.

Gastrointestinal anti-parasitics:

Albon (sulfadimethoxine): 55 mg/kg by mouth one time then 27.5 mg/kg every 24 hours for 3-14 days (2 days past resolution of clinical signs). Treats coccidial parasites (not coccidioidomycosis, aka Valley Fever).

Metronidazole: 15-22 mg/kg by mouth every 12 hours for 5-7 days. Treats Giardia.

Panacur (fenbendazole): 50 mg/kg by mouth every day for 5 days. Treats Giardia as well as roundworms, whipworms, and hookworms.

Pyrantel: 5–10 mg/kg by mouth one time; repeat in 14 days. Treats roundworms, whipworms, and hookworms.

Praziquantel: 5–10 mg/kg by mouth one time. Treats tapeworms.

Nonsteroidal antiinflammatories (NSAIDs):

If using oral versions, always give with food. Do not use NSAIDs in an animal that is dehydrated, if kidney or liver disease is present, or if any gastrointestinal signs (vomiting, diarrhea, or stool that is bloody or black). Most clinicians recommend a minimum age of 8 weeks old for use of NSAIDs in puppies, although carprofen is labeled for use at 6 weeks and older in dogs.

NSAIDs must not be used at the same time as corticosteroids, and a minimum of a 24 hour washout (i.e. waiting 24 hours after the last dose of one anti-inflammatory before starting the alternate anti-inflammatory) should occur if switching from one to the other when using oral drugs. If injectable versions are used, the duration of effect must be taken into account. For example, if a steroid was given previously that typically lasts 7 days, an NSAID cannot be used for at least 7 days.

Carprofen: 2.2 mg/kg by mouth or subcutaneously every 12 hours in dogs 6 weeks or older.

Deramaxx (deracoxib): 3–4 mg/kg by mouth once a day for up to 7 days, then 1–2 mg/kg once a day every 24 hours thereafter.

Galliprant (grapiprant): 2 mg/kg by mouth every 24 hours.

Meloxicam: 0.2mg/kg by mouth or subcutaneously on day 1 then reduced to 0.1mg/kg for subsequent days (days 2, 3, and beyond).

Corticosteroids (steroids):

Corticosteroids are potent anti-inflammatories but are separated here from the nonsteroidal anti-inflammatories (NSAIDs) since they cannot be used together. *Corticosteroids must not be used at the same time as NSAIDs*, and a minimum of a 24 hour washout (i.e. waiting 24 hours after the last dose of one anti-inflammatory before starting the alternate anti-inflammatory) should occur if switching from one to the other when using oral drugs. If injectable versions are used, the duration of effect must be taken into account. For example, if a steroid was given previously that lasts one week, an NSAID cannot be used during that week.

Note that dosages provided are the anti-inflammatory doses and not the immunosuppressive or chemotherapeutic doses of corticosteroids.

Dexamethasone SP: 0.25 mg/kg IM or IV every 24 hours. If used for more than 4 days, must be weaned down; *do not stop abruptly*. Note that Dexamethasone comes in various formulations, and the dosage provided is for the SP version.

Prednisone / prednisolone: 0.25–0.5 mg/kg by mouth every 12 hours. If used for more than 4 days, must be weaned down; *do not stop abruptly*. Speak to your veterinarian to establish a weaning schedule.

Pain control (analgesia):

The first line of pain control is frequently NSAIDs, with additional medications added as needed or in cases in which NSAIDs cannot be used. Please note that despite the common use of gabapentin and tramadol in the veterinary world, multiple studies suggest that neither drug is effective for analgesia (pain control). As such, injectable opioid medication should be used if available.

Butorphanol is not included in this section since it is widely regarded to be a very poor analgesic and its use is not recommended for pain control.

Buprenorphine: 0.01 to 0.04 mg/kg SC, IM, or IV every 6-8 hours.

Hydromorphone: 0.05-0.2 mg/kg SC, IM, or IV every 4-6 hours.

Gabapentin: 10-20 mg/kg by mouth every 8-12 hours in dogs. Gabapentin was originally marketed for neuropathic pain, and its use for other forms of pain (orthopedic, gastrointestinal, etc.) has been demonstrated to be ineffective in multiple studies.

Methadone: 0.1–0.5 mg/kg SC, IM, or IV every 4 hours.

Tramadol: 2–4 mg/kg by mouth every 8 hours.

Anticonvulsants (for seizures):

Keppra (levetiracetam): 20-30 mg/kg by mouth every 8 hours. For acute seizures, may be given at 30–60 mg/kg IV slow bolus over 5–15 minutes.

Midazolam: 0.5 to 1 mg/kg IM or IV in case of active grand mal seizure (anticonvulsant). May also be given 0.2 mg/kg intranasally.

Phenobarbital: 12 to 24 mg/kg IV loading dose. 2.5 mg/kg by mouth every 12 hours for starting maintenance dose. May take up to 2 weeks to achieve full effect..

Valium (diazepam): 0.5–2 mg/kg IV in case of active grand mal seizure (anticonvulsant). Also may be given 0.5 mg/kg rectally, or 0.5 mg/kg nasally.

Sedatives:

Acepromazine: 0.2-0.5 mg/kg by mouth. *Do not use in dogs with known cardiac disease.*

Butorphanol: 0.1–0.5 mg/kg by mouth, SC, IM, or IV every 6 hours.

Gabapentin: 10-30 mg/kg by mouth every 8 to 12 hours

Midazolam: 0.1 to 0.4 mg/kg SC, IM, or IV every 8 hours..

Trazodone: 2-3 mg/kg by mouth every 8 hours.

Valium (diazepam): 0.5–2.2 mg/kg by mouth every 6-24 hours.

Cardiac:

Butorphanol: 0.1–0.5 mg/kg by mouth, SC, IM, or IV every 6 hours for coughing.

Enalapril: 0.5-1.0 mg/kg by mouth every 12-24 hours long term.

Benazapril: 0.25-0.5 mg/kg by mouth every 12-24 hours long term.

Furosemide: 2-8 mg/kg by mouth every 12 hours. 2-6 mg/kg IM or IV every 4 hours with pulmonary edema. Diuretic. Ensure access to drinking water at all times.

Hydrocodone: 0.22 mg/kg by mouth every 6 hours for coughing.

Vetmedin (pimobendan): 0.25 mg/kg by mouth every 12 hours long term.

Ocular (eyes):

Do not touch the eye surface directly with the applicator tip when using ointments; meds must be dropped onto the surface of the eye.

Ciprofloxacin / Oflaxacin: 1 drop to affected eye every 1-6 hours for at least 5 days.

Triple ophthalmic antibiotic (neomycin sulfate / polymyxin B sulfate / bacitracin zinc): 1 drop (solution) or 1/4" strip (ointment) applied directly onto the cornea every 6-8 hours for at least 5 days. These are combinations of different topical ophthalmic antibiotics, and there are different formulations that may be labeled in different order of the the antibiotics *If you have triple ophthalmic antibiotic with dexamethasone or hydrocortisone*, talk to your veterinarian before using (topical ophthalmic corticosteroids cannot be used with corneal defects; the eye must be stained prior to use of a topical corticosteroid).

Aural (ears):

Mometomax: Apply a small amount to the affected ear canal every 24 hours for 5-14 days in dogs. Used for ear infections and contains an antibiotic, antifungal (anti yeast), and topical corticosteroid.

Otomax: Apply a small amount to the affected ear canal every 24 hours for 5-14 days in dogs. Used for ear infections and contains an antibiotic, antifungal (anti yeast), and topical corticosteroid.

Tresaderm: 10 drops to affected ear every 12 hours for 7 days.

Heartworm prevention:

Heartworm prevention without prior testing can be done but should be limited to the use of products containing only ivermectin or moxidectin since these are safe for use even if heartworm positive, and are also effective long term medications against adult heartworms given enough time (see text). Selamectin can safely be used without heartworm testing, but has no efficacy against adult heartworms.

Follow label instructions as to frequency and the appropriate dosage for body weight.

Muscle relaxant:

Methocarbamol: 40 mg/kg by mouth initial dose, then 20 mg/kg by mouth every 8 hours thereafter.

Valley Fever (coccidioidomycosis):

Note that coccidioidomycosis (systemic fungal infection) is a completely different infection than coccidiosis (intestinal parasite).

Fluconazole: 10 mg/kg by mouth every 12 hours for 6 months minimum. Most practitioners recommend one year however.

Spinal trauma / intervertebral disc disease:

Most veterinarians use a 1-2 week combination of a muscle relaxant, pain medication, and an anti-inflammatory (NSAID or steroid, but not both).

For example, a dog might receive an initial injection of hydromorphone for pain and an injection of dexamethasone SP for inflammation,, then start oral gabapentin, oral prednisone, and oral methocarbamol. Because the injectable dexamethasone lasts 24 hours, prednisone would not be started until the 24 hour mark post dexamethasone.

Rodenticide (rat bait) ingestion (warfarin type only; will not treat bromethalin type):

Dogs may be directly exposed by bait ingestion or by eating rodents that have previously eaten bait.

Vitamin K (phytonadione): 5 mg/kg SC one time then 5vmg/kg by mouth once daily for 28 days.

Distemper infection:

Treatment is largely centered on respiratory antibiotics (if clinical signs are present) and anticonvulsants (if clinical signs are present). See pertinent formulary sections above for options.

For example, Clavamox could be started at 13.75mg/kg by mouth every 12 hours for respiratory signs, and/or Keppra (levetiracetam) at 30 mg/kg by mouth every 8 hours for neurologic signs.

Parvovirus infection:

Treatment for parvovirus infection depends on the severity of the clinical signs, and can range from no treatment (e.g. a dog with no clinical signs but is from a litter that tests positive) to needing IV treatment in a hospital setting far beyond any outpatient field treatment.

Treatment is largely centered on fluid therapy, antibiotics, anti-nausea medications, and narcotic (i.e. not NSAID) pain medications. See pertinent formulary sections above for options in each category.

For example, in a moderately severe case in which a blood smear demonstrated few white blood cells, LRS or Plasmalyte could be given at 20 ml/# SQ once a day (44 ml/kg) for fluid therapy. Due to vomiting, oral medication may be initially avoided and instead injectable meds could be started with ampicillin 30 mg/kg SC every 8 hours, then when rehydrated enrofloxacin is added at 10 mg/kg once daily (for broad spectrum antibiotic coverage). For vomiting, Cerenia could be given at 1 mg/kg SQ once daily, as well as ondansetron at 0.5mg/kg SQ every 12 hours. Finally, for pain control, buprenorphine could be given at 0.03 mg/kg SQ every 8 hours.

If the vomiting were to resolve in 24 hours and the dog were to begin to eat small amounts, antibiotic therapy could be changed to oral Clavamox at 13.75 mg/kg twice daily and enrofloxacin at 10 mg/kg once daily. Anti-nausea meds could be continued despite the lack of vomiting, with Cerenia switched to the oral version at 2 mg/kg once a day for the next 4 days (the full 5 day maximum course), and ondansetron also switched to the oral version at 0.5 mg/kg twice daily. Pain management could be stopped to see if the appetite improves off of pain meds, or could be continued (if the dog's abdomen seems painful) with buprenorphine since injectable pain management is more reliable than the oral use of gabapentin or tramadol (NSAIDs are not an option with

gastrointestinal disease, and corticosteroids may cause further immunosuppression in addition to that caused by parvovirus infection).

Acute allergic reaction:

A combination of diphenhydramine, famotidine, and a corticosteroid (either prednisone or dexamethasone, but not both) is typically used for 24-48 hours.

Benadryl (diphenhydramine): 2–4 mg/kg by mouth, SC, or IM every 8-12 hours until clinical signs resolve. For acute anaphylactic reactions, many emergency clinicians will administer diphenhydramine slow IV.

Dexamethasone SP: 0.25 mg/kg IM or IV every 24 hours until clinical signs resolve. If used for more than 4 days, must be weaned down; *do not stop abruptly*. Note that Dexamethasone comes in various formulations, and the dosage provided is for the SP version.

Pepcid (famotidine): 0.5-1.0 mg/kg by mouth, SQ, IM, or IV every 12 hours until clinical signs resolve.

Prednisone / prednisolone: 2–4 mg/kg by mouth every 24 hours until clinical signs resolve. If used for more than 4 days, must be weaned down; *do not stop abruptly*.

Euthanasia:

Pentobarbital solutions for euthanasia: 108 mg/kg (1 mL/5 kg) IV. Can also be given as an abdominal (intraperitoneal) injection without sedation (will take several minutes to effect). Intracardiac injections *must* be done under anesthesia. Animals euthanized should be deeply buried or cremated since scavengers can also die from ingestion of animals previously euthanized.

Cat formulary

Soft tissue infections (bite wounds, trauma, urinary tract infections, etc.):

Amoxicillin: 20 mg/kg by mouth every 8-12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections.

Ampicillin: 20-30 mg/kg by mouth, SQ, IM, or slow IV (over 15 minutes) every 8-12 hours (or until can be switched to oral ampicillin, oral Clavamox, or oral amoxicillin).

Cefazolin: 33 mg/kg IM or IV every 8 hours (or until can be switched to oral cephalexin or oral cefpodoxime).

Cefpodoxime: 5–10 mg/kg by mouth every 24 hours for 7-14 days.

Cephalexin: 25 mg/kg by mouth every 8 hours for 7-14 days. Most commonly used for dermal infections but can be used for other soft tissue as well as dental infections.

Clindamycin: 11–33 mg/kg by mouth for 7–28 days. Most commonly used for dental infections but can be used for soft tissue and orthopedic infections.

Ciprofloxacin: 30 mg/kg by mouth once a day for 7 days. Most commonly used as a cheaper alternative to enrofloxacin.

Clavamox (amoxicillin/clavulanic acid) 13.75 mg/kg by mouth every 12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections. Broader spectrum than amoxicillin but typically more expensive.

Convenia (cefovecin): 8 mg/kg SQ one time (duration of effect 2 weeks)

Enrofloxacin: 5 mg/kg by mouth or subcutaneously once a day for 7 days. If given as an injection, dilute with an equal volume of sterile saline. *Enrofloxacin should not be used in a dehydrated animal or one with kidney disease, and as such the animal should be eating and not vomiting.*

Metronidazole: 15-22 mg/kg by mouth every 12 hours for 5-7 days. Less commonly used at 10 mg/kg slow IV (over 15 minutes) every 8 hours, in combination with other

antibiotics in septic patients and those unable to take oral meds, such as panleukopenia (parvoviral) cases. Soft tissue antibiotic specifically used for anaerobic infections.

Penicillin Procaine: 30 mg/kg SQ once daily for 5 days. Some labels use IU/ml instead of mg/ml, in which case the appropriate dosage is 20,000–40,000 IU/kg SC. Use a new injection site each day.

Orthopedic infections:

Cephalexin: 30 mg/kg by mouth every 8 hours for 30-45 days.

Clavamox (amoxicillin/clavulanic acid) 13.75 mg/kg by mouth every 12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections. Broader spectrum than amoxicillin but typically more expensive.

Respiratory infections:

Amoxicillin: 20 mg/kg by mouth every 8-12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections.

Ampicillin: 20-30 mg/kg by mouth, SQ, IM, or slow IV (over 15 minutes) every 8-12 hours (or until can be switched to oral ampicillin, oral Clavamox, or oral amoxicillin).

Clavamox (amoxicillin/clavulanic acid) 13.75 mg/kg by mouth every 12 hours for 7-14 days. Most commonly used for soft tissue infections but can be used with dental infections. Broader spectrum than amoxicillin but typically more expensive.

Doxycycline: 10 mg/kg by mouth every 12 hours for 7-28 days. *Follow with food or water after use to prevent esophageal strictures.*

Anti-vomiting / anti-nausea:

Cerenia (maropitant): 2 mg/kg by mouth every 24 hours, or 1 mg / kg SQ or IV every 24 hours.

Metoclopramide: 0.5 mg/kg by mouth, IM, or IV every 8 hours. *Cannot be used if there is the risk of a gastrointestinal foreign object.*

Ondansetron: 0.4–1 mg/kg by mouth, SQ, or IV every 12 hours.

Nonsteroidal antiinflammatories (NSAIDs):

Cats are very sensitive to NSAIDs, and corticosteroids are more commonly used for inflammation. If using oral versions, always give with food. Do not use in an animal that is dehydrated, if kidney or liver disease is present, or if any gastrointestinal signs (vomiting, diarrhea, or stool that is bloody or black). Most clinicians recommend a minimum age of 8 weeks old for use of NSAIDs in kittens.

NSAIDs must not be used at the same time as corticosteroids, and a minimum of a 24 hour washout (i.e. waiting 24 hours after the last dose of one anti-inflammatory before starting the alternate anti-inflammatory) should occur if switching from one to the other when using oral drugs. If injectable versions are used, the duration of effect must be taken into account. E.g., if an injection of a corticosteroid was given that is expected to last 7 days, an NSAID cannot be used for at least 7 days.

Onsior (robenacoxib): 1 mg/kg by mouth every 24 hours for 3-6 days.

Meloxicam: 0.1mg/kg by mouth every 24 hours for no more than 3 days. Alternatively, cats can receive a subcutaneous injection of 0.3mg/kg under the skin one time.

Corticosteroids (steroids):

Corticosteroids are potent anti-inflammatories but are separated here from the nonsteroidal anti-inflammatories (NSAIDs) since they cannot be used together. *Steroids must not be used at the same time as NSAIDs, and a minimum of a 24 hour washout (i.e. waiting 24 hours after the last dose of one anti-inflammatory before starting the alternate anti-inflammatory) should occur if switching from one to the other when using*

oral drugs. If injectable versions are used, the duration of effect must be taken into account. Eg., if an injection of meloxicam was given that is expected to last 3 days, a corticosteroid should not be given for at least 3-5 days after the meloxicam.

Note that dosages provided are the anti-inflammatory doses and not the immunosuppressive or chemotherapeutic doses of corticosteroids.

Dexamethasone SP: 0.2 mg/kg IM or IV every 24 hours. Note that Dexamethasone comes in various formulations, and the dosage provided is for the SP version.

Prednisolone: 0.5–2.5 mg/kg by mouth every 24 hours. *Note that prednisolone (not prednisone) should only be used in cats.* If used for more than 4 days, must be weaned down; *do not stop abruptly.* Speak to your veterinarian to establish a weaning schedule.

Pain control (analgesia):

Buprenorphine: 0.01 to 0.04 mg/kg by mouth, SC, IM, or IV every 6-8 hours (lower doses have shorter duration of effect; higher doses have longer duration of effect). If using Simbadol, 0.24 mg/kg every 24 hours up to 3 days. If using buprenorphine SR (sustained-release), 0.12 mg/kg SC every 72 hours.

Gabapentin: 50 to 100 mg (*not mg/kg!*) per cat by mouth every 8 to 12 hours.

Hydromorphone: 0.05–0.1 mg/kg SC or IM every 4 hours.

Tramadol: 2–4 mg/kg by mouth every 12 hours.

Anti-convulsants (anti-seizure):

Keppra (levetiracetam): 20 mg/kg by mouth every 8 hours. For acute seizures, may be given at 20 mg/kg IV slow bolus over 5–15 minutes.

Midazolam: 0.5 to 1 mg/kg IM or IV in case of active grand mal seizure (anticonvulsant).

Phenobarbital: 16 to 20 mg/kg IV one time for loading dose. 1 to 5 mg/kg by mouth every 12 hours for maintenance.

Valium (diazepam): 0.5–2 mg/kg IV in case of active grand mal seizure (anticonvulsant). Can also be given at 1.25–2.5 mg rectally.

Sedatives:

Gabapentin: 50 to 200 mg (*not mg/kg!*) per cat by mouth every 12-24 hours.

Midazolam: 0.1 to 0.4 mg/kg SC, IM, or IV.

Trazodone: 50 mg by mouth one time

Valium (diazepam): 0.5 mg/kg by mouth or IV every 8-12 hours. Repeated oral dosing should be avoided.

Gastrointestinal anti-parasitics:

Metronidazole: 25 mg/kg by mouth every 12 hours for 5-7 days. Treats Giardia.

Panacur (fenbendazole): 50 mg/kg by mouth every day for 5 days. Treats Giardia as well as roundworms, whipworms, and hookworms.

Praziquantel: 4.6–10 mg/kg by mouth one time. Treats tapeworms.

Pyrantel: 5–10 mg/kg by mouth one time. Treats roundworms, hookworms, and whipworms.

Ocular (eyes):

Do not touch the eye surface directly with the applicator tip when using ointments; meds must be dropped onto the surface of the eye.

Tobramycin: 1 drop to affected eye applied directly onto the cornea every 1-6 hours for at least 5 days.

Terramycin: ¼" strip to affected eye applied directly onto the cornea every 6-8 hours for at least 5 days.

Aural (ears):

Revolution (selamectin): 6 mg/kg topically one time. Used to treat ear mites.

Tresaderm (thiabendazole / dexamethasone / neomycin): 10 drops to affected ear every 12 hours for 7 days. Used to treat bacterial and fungal ear infections.

Mange treatment (Demodex, Notoedres) / flea / tick treatment:

Cats should only receive skin parasite medications or medicated collars that are labeled for use in cats. Do not use medications or medicated collars that are labeled for dogs.

Many medications given off-label will successfully treat mange. The off-label status for mange is typically because these products are marketed towards more common flea and tick issues in richer non-Third World areas where mange is rare. As such, manufacturers have not invested the time and money required in testing to prove for marketing label purposes that the products also treat the parasites that cause mange. However, these medications do in fact treat the skin parasites that cause mange and have been confirmed in multiple independent studies.

Multiple options exist. Treatment in cats is with the use of topical Revolution (selamectin) or Bravecto (fluralaner) every 2-4 weeks for 1-2 months. Follow label instructions as to frequency, and ensure that the correct strength is given for the appropriate body weight (which may be in pounds per the label). For young kittens, Revolution (selamectin) is labeled for use at 6 weeks of age and older, but veterinary toxicology consultants have routinely used selamectin at 4 weeks of age without issue.

Heartworm prevention:

Selamectin, ivermectin, and moxidectin can safely be used without heartworm testing.

Follow label instructions as to frequency and the appropriate dosage for body weight.

Rodenticide (rat bait) ingestion (warfarin type only; will not treat bromethalin type):

Cats may be directly exposed by bait ingestion or by eating rodents that have previously eaten bait.

Vitamin K (phytonadione): 5 mg/kg SC one time then 5vmg/kg by mouth once daily for 28 days.

Panleukopenia viral infection:

Treatment for panleukopenia (feline parvoviral infection) depends on the severity of the clinical signs, and can range from no treatment (e.g. a cat with no clinical signs but is from a litter that tests positive) to needing IV treatment in a hospital setting far beyond any outpatient field treatment.

Treatment is largely centered on fluid therapy, antibiotics, anti-nausea medications, and narcotic (i.e. not NSAID) pain medications. See pertinent formulary sections above for options in each category.

For example, in a moderately severe case in which a blood smear demonstrated few white blood cells, LRS or Plasmalyte could be given at 20 ml/# SQ once a day (44 ml/kg) for fluid therapy. Due to vomiting, oral medication may be initially avoided and instead injectable meds could be started with ampicillin 30 mg/kg SC every 8 hours, then when rehydrated enrofloxacin is added at 10 mg/kg once daily (for broad spectrum antibiotic coverage). For vomiting, Cerenia could be given at 1 mg/kg SQ once daily, as well as ondansetron at 0.5mg/kg SQ every 12 hours. Finally, for pain control, buprenorphine could be given at 0.03 mg/kg SQ every 8 hours.

If the vomiting were to resolve in 24 hours and the cat were to begin to eat small amounts, antibiotic therapy could be changed to oral Clavamox at 13.75 mg/kg twice daily and enrofloxacin at 10 mg/kg once daily. Anti-nausea meds could be continued despite the lack of vomiting, with Cerenia switched to the oral version at 2 mg/kg once a day for the next 4 days (the full 5 day maximum course), and ondansetron also switched to the oral version at 0.5 mg/kg twice daily. Pain management could be stopped to see if the appetite improves off of pain meds, or could be continued (if the cat's abdomen seems painful) with buprenorphine (oral or injectable) since injectable pain management is more reliable than the oral use of gabapentin or tramadol (NSAIDs are not an option with gastrointestinal disease, and corticosteroids may cause further immunosuppression in addition to that caused by parvovirus infection).

Feline Urologic Syndrome (FUS) / Feline Lower Urinary Tract Disease (FLUTD) / Cystitis:

Many veterinarians will use a combination of a pain medication (eg. buprenorphine or gabapentin), a urethral smooth muscle relaxer (prazosin or phenoxybenzamine), and an external urethral sphincter relaxer (diazepam or midazolam). *Use of an anti-inflammatory should be limited to steroids (do not use NSAIDs).*

Acepromazine: 1.25-2.5 mg by mouth or 0.01–0.1 mg/kg SC, IM, or IV every 8 hours. Do not use in combination with diazepam or midazolam.

Buprenorphine: 0.01 to 0.04 mg/kg by mouth, SC, IM, or IV every 6-8 hours (lower doses have shorter duration of effect; higher doses have longer duration of effect). If using Simbadol, 0.24 mg/kg every 24 hours up to 3 days. If using buprenorphine SR (sustained-release), 0.12 mg/kg SC every 72 hours.

Gabapentin: 50 to 100 mg (not mg/kg!) by mouth every 8 to 12 hours.

Midazolam: 0.1 to 0.4 mg/kg SC, IM, or IV.

Phenoxybenzamine: 2.5–7.5 mg (not mg/kg!) by mouth every 8 hours.

Prazosin: 0.25 to 1 mg (not mg/kg!) by mouth every 12 hours.

Prednisolone: 0.5–2.5 mg/kg by mouth every 24 hours. *Note that prednisolone (not prednisone) should only be used in cats.* If used for more than 4 days, must be weaned down; *do not stop abruptly.* Speak to your veterinarian to establish a weaning schedule.

Valium (diazepam): 0.5 mg/kg by mouth or IV every 8-12 hours. Repeated oral dosing should be avoided.

Spinal trauma / intervertebral disc disease:

Most veterinarians use a 1-2 week combination of a muscle relaxant, pain medication, and a steroidal anti-inflammatory (not an NSAID).

For example, a cat might receive an initial injection of buprenorphine for pain and an injection of dexamethasone SP for inflammation, then start oral gabapentin, oral prednisolone, and oral methocarbamol. Because the injectable dexamethasone lasts 24 hours, prednisone would not be started until the 24 hour mark post dexamethasone.

Methocarbamol: 20 mg/kg by mouth every 8 hours. Muscle relaxant.

Prednisolone: 0.5–2.5 mg/kg by mouth every 24 hours. *Note that prednisolone (not prednisone) should only be used in cats.* If used for more than 4 days, must be weaned down; *do not stop abruptly.* Speak to your veterinarian to establish a weaning schedule.

Acute allergic reaction:

A combination of diphenhydramine, famotidine, and a corticosteroid (either prednisolone or dexamethasone, but not both) is typically used for 24-48 hours.

Benadryl (diphenhydramine): 2–4 mg/kg by mouth every 8 hours, or 1 mg/kg IM every 8-12 hours until clinical signs resolve.

Dexamethasone SP: 0.2 mg/kg IM or IV every 24 hours. Note that Dexamethasone comes in various formulations, and the dosage provided is for the SP version.

Pepcid (famotidine): 0.5-1.0 mg/kg by mouth, SQ, IM, or IV every 12 hours until clinical signs resolve.

Prednisolone: 2–4 mg/kg by mouth every 24 hours until clinical signs resolve. *Note that prednisolone (not prednisone) should only be used in cats.* If used for more than 4 days, must be weaned down; *do not stop abruptly.* Speak to your veterinarian to establish a weaning schedule.

Euthanasia:

Pentobarbital solutions for euthanasia: 108 mg/kg (1 mL/5 kg) IV. Can also be given as an abdominal (intraperitoneal) injection without sedation (will take several minutes to effect). Intracardiac injections *must* be done under anesthesia. Animals euthanized should be deeply buried or cremated since scavengers can also die from ingestion of animals previously euthanized.

Quick fluid therapy and blood transfusion

Fluid therapy:

SQ fluids: 10-20ml/lb (22-44 ml/kg) once daily (SID).

IV fluids: A very basic approach is 1ml/lb/hr CRI for maintenance, can be doubled or tripled depending on desired rate (eg. 2X maintenance is 2ml/lb/hr).

Whole blood transfusion:

In the field setting, it is not uncommon to examine animals that are severely anemic and are at risk of dying without a transfusion to buy them time while the underlying disease process is treated (i.e. a transfusion does not solve underlying disease and will extend an animal life by only a few days if the underlying problem is not corrected). Keeping blood collection bags and blood administration sets on hand is therefore advisable since they are cheap, can sit on the shelf for long periods without refrigeration, and can ultimately save lives.

Dogs can usually safely receive their first transfusion without crossmatch or blood typing; cats must be blood typed and be the same as the donor. Although in a MASH style setting it may not be possible to ensure that an animal blood bank level of infectious disease screening is done, donors should at least be healthy adults that have been screened for the common pathogens to the area (eg. dogs should be screened for heartworm disease and the more common rickettsial tick borne diseases; cats should be screened for feline leukemia, FIV, and heartworm). Always use a blood transfusion set with a filter, begin transfusions at 1-2ml/minute, and monitor for reactions. The rate can increase to 3-6ml/minute for dogs only, but cats should remain at the lower rate. Fresh whole blood transfusion should be completed within 4-6 hours of collection, or within 24 hours if stored in a refrigerator and with an appropriate sodium citrate based anticoagulant (e.g. CPDA-1). Sterility is very important at every step of the transfusion procedure, from collection to administration.

Basic tableside crossmatch: Collect blood from donor and recipient. Centrifuge both samples for 1 minute (at 3400G), then remove and save the labeled plasma from both. Wash the remaining RBCs (red blood cells) from both patients (labeled, in different tubes) with saline, re-centrifuge, discard the supernatant fluid on

the top. Repeat the washing procedure twice more. Make an RBC solution for each patient by adding 0.02ml of washed RBCs to 0.98cc of saline. Using a new tube, mix 2 drops of donor RBC suspension with 2 drops of recipient plasma. Using a second tube, mix 2 drops of recipient RBC suspension with 2 drops of donor plasma. Incubate for 30 minutes (at 25 degrees Celsius), then centrifuge tubes for 1 min (at 3400G) and gently rock the tubes and look for agglutination (clumping). A compatible donor/recipient will not agglutinate (i.e., agglutination means the donor should be used with the recipient). If an incubator is not available, 2 drops of the donor RBC suspension can be mixed on a slide with 2 drops of recipient plasma on a clean slide, and gently rocked to look for agglutination (less ideal but usually sufficient).

Canine: Whole blood (not packed RBCs) transfusion amount (mL) = $[(PCV_{desired} - PCV_{current}) / PCV_{donor}] \times \text{body weight (kg)} \times 88 \text{ mL/kg}$. A very rough field cheat is to give dogs ~10ml/lb (22ml/kg) of whole blood from a healthy donor.

Maximum whole blood donation (collection) from a large >30kg healthy dog at least a year old: 420-450cc, measured as an empty (other than anticoagulant) blood bag gaining 435-477g on a gram kitchen scale.

Feline: Whole blood (not packed RBCs) transfusion amount (mL) = $[(PCV_{desired} - PCV_{current}) / PCV_{donor}] \times \text{body weight (kg)} \times 66 \text{ mL/kg}$.

Maximum whole blood donation (collection) from a >4.5kg healthy indoor only cat between 1-7 years old: 45-60cc of whole blood drawn then mixed with ~7cc of a sodium citrate based anticoagulant solution (1 part CPDA-1 to 7 parts whole blood). A less ideal alternative is to mix 50cc of whole blood with 625 units (not ml) of heparin.