PRESCRIBED, OTC, RECREATIONAL DRUGS ASSOCIATED WITH SMALL ANIMAL INTOXICATIONS

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We live in a “medicated world.” If, you doubt that statement, simply sit down and watch the cavalcade of pharmaceutical advertisements which takes place 24/7 on network television. Taking into account all of the prescription, over-the-counter (OTC) traditional AND herbal, and recreational drugs surrounding our pets, it should be no surprise that there is an increasing rate of dog and cat intoxications involving “drugs.” In fact, according to National Animal Poison Control Center, prescription medications and veterinary medications were some of the top toxicants in 2018. [https://www.aspcapro.org/blog/2019/03/07/top-10-animal-toxins-2018](https://www.aspcapro.org/blog/2019/03/07/top-10-animal-toxins-2018)

ALWAYS KEEP MEDICATIONS OUT OF REACH OF CHILDREN AND PETS. FOR VETERINARY MEDICATIONS, ALWAYS READ LABELS AND FOLLOW LABEL INSTRUCTIONS.

Acknowledging that, to ALMOST ALL of our clients, pet survival takes precedence over successful diagnosis, it is important to remember the mantra “TREAT THE PATIENT, NOT THE POISON” (UNLESS THERE ARE WITNESSES). THEREFORE, before going on to specific “DRUGS”, the “BASICS” of managing any suspected intoxication, which apply directly to “DRUGS”, are reviewed here and will be quickly summarized during oral presentation.

OVERVIEW of Basic Clinical Management of Suspected “Drug” Intoxications:

REVIEW of Basic Workup of a Suspected Drug Intoxication/Look Familiar???:

- Usually an EMERGENCY!!!
  - Simultaneously incorporates aspects of treatment and diagnosis
  - FIRST THINGS FIRST!!! PATIENT SURVIVAL OFTEN HIGHER PRIORITY THAN Dx
    - Determine what is actually in suspected “DRUGS”/Jump right to treatment???
  - Possible rationale for having yourself or technicians cloned!!!

- Signalment + Clinical Signs/Clinical Circumstances
  - Which Pet or Pets (be sure all present and accounted for)?
  - What “Drug” or “Drugs” (how certain/labeled or unlabeled/multiple drugs/legalitity)?
  - When (approximate time or day/might be clueless)?
  - Where (IF known/how certain of location/other possibilities)?

- Problem List
  - WHAT’S WRONG? SOME CLINICAL SIGNS “TOXICANT X” SPECIFIC/SOME GENERIC
    - Physical examination and STAT laboratory testing, IF proximate to patient

- “BIG PICTURE” PROBLEMS
  - SUMMARY OF CRITICAL ISSUES AND TARGET SYSTEMS/ORGANS
  - TREAT THE PATIENT NOT DRUG, UNLESS EXPOSURE TO TOXIC “DRUG” OBSERVED!!!
  - STABILIZATION OF THE PATIENT IS NUMBER ONE PRIORITY!!!

- D.A.M.N.I.T.
  - D = Degenerative
  - A = Anomaly
  - M = Metabolic
  - N = Nutritional/Neoplastic
  - I = Infectious/Inflammatory/Idiopathic
  - T = Traumatic/Toxic
OVERVIEW of Basic Clinical Management of Suspected Drug Intoxications (CONTINUED):

REVIEW of Basic Workup of a Suspected Drug Intoxication/Look Familiar???

- **DRUG POISONING SHOULD BE SUSPECTED WHEN:**
  - **OBSERVED “DRUG” INGESTION/“DRUG”/PACKAGING IN VOMITUS OR GI TRACT**
  - Sudden death/Similar clinical signs in **MULTIPLE** animals
  - Rapid onset of afebrile syndrome or sudden death of a previously healthy animal.”
  - **IF “OBVIOUS” INTOXICATION BY “DRUGS”, GO IMMEDIATELY TO EMERGENCY Rx!!!**

- **ONCE ANIMAL STABLE/DIAGNOSIS STILL UNCERTAIN: CONTINUE STEPWISE WORKUP**

- List Drugs/Other toxic and nontoxic differentials

- **Most likely FINAL “Drug” diagnosis and WHY?**
  - Not always possible
  - Helpful to know toxic mechanism of action (MOA) of “Drugs”
  - Might need to consult a formulary or “expert”
  - Good correlation of “Drug” MOA with Problem List supports Dx of “Drug” toxicosis
  - Can incorporate knowledge of “Drug” MOA into successful treatment plan
  - “Drug” toxicosis treated/”Drug” diagnosis confirmed by laboratory testing
  - Sometimes not possible to do both!!!

**DETAILED Clinical Management of Suspected “Drug” Intoxications, Including Rx/Dx:**

**EMERGENCY Rx/TREATMENT** of Suspected “Drug” Intoxications (SHOULD LOOK FAMILIAR!!!):

- **REMOVE THE ANIMAL(S) FROM THE SOURCE!!!**
  - MIGHT ACTUALLY BE REMOVAL OF THE SUSPECTED SOURCE FROM THE ANIMAL!!!
  - House/Yard management

- **IMMEDIATE VETERINARY CARE!!!**

- **TREAT THE PATIENT NOT THE DRUG, UNLESS DRUG EXPOSURE IS OBSERVED!!!**

- **STABILIZATION ABCs**
  - Airway/Breathing/Circulation/Depression/Excitation/Fever/Hypothermia
  - Supportive care

- Decontamination/Antidotal therapy AND/OR Lipid Infusion for Specific “Drugs”

  - Decontamination is ANOTHER way to separate the source from the animal!!! Depends on the route of exposure and stage of the intoxication
    - Bathing if plant material on paws (think cats)
    - Emesis/GI lavage/Activated charcoal (repeated?) ± Cathartics if ingested “Drugs”
    - MAKE SURE INDUCTION OF EMESIS+ NOT CONTRAINDICATED
    - Some specific antidotes for “Drugs”/Lipid infusion limited to a few “Drugs”

**CONFIRMING** Diagnosis of Suspected “Drug” Intoxications (NOT ALWAYS POSSIBLE):

- **OBSERVED “DRUG” EXPOSURE/“DRUGS”/PACKAGING IN VOMITUS OR GI TRACT**

- **MIGHT NOT NEED TO GO MUCH FURTHER FOR IDENTIFIABLE “DRUG”!!!**

- **POSSIBLE EXCEPTION FOR “LEGAL” CASES WHERE “DRUG” CONFIRMATION NEEDED**

- **IF THE ABOVE DOESN’T HAPPEN OR “LEGAL”**: Make sure detailed and accurate history!!!

  - Usually 1st stage of assessing signalment + clinical signs/clinical circumstances

- **NEXT STEP**: Physical examination of the stabilized alive and/or very dead animal

  - Usually 2nd stage of signalment + clinical signs/clinical circumstances assessment

- Tentative “Drug” diagnosis/Most likely differential is “Drug”

- Correlation of “Drug” MOA to Problem List helps support FINAL “Drug” Dx.

- Evaluate the efficacy of treatment in progress, especially antidotes for specific “Drugs”
DETAILED Clinical Management of Suspected “Drug” Intoxications (CONTINUED):

CONFRAMING Diagnosis of Suspected “Drug” Intoxications (NOT ALWAYS POSSIBLE/continued):

- Clinical pathology IF ALIVE/Possible laboratory analyses for “Drugs”
- Necropsy Exam/Histopathology ± Toxicology Testing IF DEAD
  - Collect appropriate samples for histopathology IN FORMALIN
  - Collect appropriate samples for possible toxicologic analyses NOT IN FORMALIN!!!
  - CAREFULLY labeled and separated samples/COC/?Refrigerated or frozen (best)
  - “Drugs”/Vomitus/Gastric Contents/Liver/Kidney/Brain (if CNS)/Urine??/Fat???
  - Knowledge of “Drug” MOA and pharmacokinetics/toxicokinetics can be helpful.
    - Often determines analyses for what and when.
  - IDEALLY, histopath/analytical results are consistent with one another and “Drug” Dx.
  - HOWEVER, GARBAGE IN = GARBAGE OUT!!!
    - “Rotten” tissues tell no tales!!!/Pathognomonic lesions might be MIA!!!
    - BUT, can’t analyze for “Drugs”, IF ideal tissue samples/source not collected.

- Challenges to diagnosing “Drug” intoxications.
  - For “Drug” known to have been given therapeutically, what does detection mean?
  - Analyses not available for all “Drugs”.
  - Ingredients in proprietary “Drugs” or illegal “Drugs” might not be known
  - Differences in analytical results between diagnostic laboratories?
  - Differences in interpretation?
  - Certainty of identification?
  - “Legal” issues
    - Illegal drugs detected?

Useful “Drug” Electronic Resources:

- MIGHT NEED TO JUST KNOW INGREDIENTS OF DRUGS/POTENTIAL ADVERSE EFFECTS
  - http://www.ahc.umn.edu/rar/umnuser/formulary.html
    - Free veterinary drug formulary
  - http://www.msds.com/
    - Website for free access to material safety data sheets (MSDS)
    - Information from MSDS for OTC household products/Lists of ingredients
  - https://www.erowid.org/
    - Psychoactive plants/drugs
  - http://www.fda.gov/AnimalVeterinary/default.htm
    - Website for Food and Drug Administration
    - Go to Animal & Veterinary tab for veterinary drug-specific information
    - Mechanism for reporting adverse drug reactions
    - Other helpful information on veterinary and human medications
    - PubMed literature search
  - Veterinary Poison Control Centers
    - http://aspcapro.org/human-animal-medication for pet professionals
Examples of “COMMON” Intoxications Associated with Various Classes of “Drugs”:

Prescription Human Medications:
- NSAIDs
  - Zorvolex (Diclofenac) → Gastric ulcers at very low dosages in cats and dogs.
- Antidepressants
  - Effexor (Venlafaxine) and Prozac (Fluoxetine) → SSRIs → ↑ Heart rate + ↑ blood pressure + hyperthermia + sedation, ataxia, tremors, and/or seizures
- Benzodiazepines and Sleep Aids
  - Xanax (Alprazolam) and Ambien (Zolpidem) → GABA agonism → CNS depression
- Muscle Relaxants
  - Baclofen → GABA derivative GABA receptors agonism → Depression, especially respiratory depression/inhibited breathing
- ADD/ADHD Medications
  - Adderall (Dextroamphetamine/Amphetamine) and Ritalin (Methylphenidate) → Stimulants → ↑ Heart rate + ↑ blood pressure + tremors, seizures, hyperthermia
- β-Blockers → Much more severe toxic effects than seen with ACE-inhibitors
  - Tenormin (Atenolol) and Coreg (Carvedilol) → Bradycardia + hypotension
- Cholesterol Lowering Agents
  - Statins → Lipitor (Atorvastatin) and Crestor (Rosuvastatin) → Vomiting + diarrhea

OTC Human Medications:
- NSAIDs
  - Advil (Ibuprofen), Aspirin, and Aleve (Naproxen) → GI + kidney + CNS (Ibuprofen)
- Pain Medications
  - Tylenol (Acetaminophen/Paracetamol) → Methemoglobinemia + hepatic necrosis
- Cold/Flu/Sinus/Sore Throat/Cough/Allergy/and “Red Eye” Medications
  - Pseudoephedrine → Sympathomimetic thermogenic stimulant
  - Caffeine → Neuroexcitation + PVCs + other cardiac arrhythmias
  - NSAIDs → Primarily GI + kidney + occasional liver involvement
  - Acetaminophen → Methemoglobinemia + hepatocellular necrosis
  - Dextromethorphan (for coughing → Serotonin agonism → Tremors + seizures
  - Imidazoline Decongestant → α2 Adrenergic agonism → Bradycardia + hypotension
  - Antihistamines → Agitation + sedation + abnormal heart rate and blood pressure
  - Benzocaine (local anesthetic) → Possible methemoglobinemia
  - Xylitol → Hypoglycemia + hepatocellular necrosis in dogs

Veterinary Medications
- NSAIDS
  - Rimadyl (Carprofen) and Phenylbutazone → GI + kidney + liver (Carprofen in dogs)
- “Dewormers”
  - Ivermectins → GABA agonism → CNS depression (especially with mutated MDR1)

Herbal Preparations
- Guarana (Methylxanthines) and Ephedra/Ma Huang (Ephedrine/Pseudoephedrine)
  - Ephedrine and pseudoephedrine are sympathomimetic thermogenic stimulants.

Recreational Drugs and Drugs of Abuse:
- Marijuana → Cannabinoids → THC → "Depression" + ataxia + incontinence
- K₂ → Synthetic cannabinoids → Variety of effects + concerns about adulteration
- Miscellaneous others, such as prescription painkillers various mild-altering "Drugs"