TOP 5 MISTAKES TO AVOID IN YOUR POISONED PATIENT

In the veterinary poisoned patient, the goal of decontamination is to “inhibit or minimize further toxicant absorption and to promote excretion or elimination of the toxicant from the body.” \(^1,2\) When treating the poisoned patient, the clinician should have an understanding of the toxic dose (if available), the pharmacokinetics (including absorption, distribution, metabolism, and excretion), the underlying mechanism of action, and the potential clinical signs that can be observed with the toxicant. \(^2\) This will help determine appropriate decontamination and therapy for the patient. If this information is not readily available, the reader is advised to contact the ASPCA Animal Poison Control Center (888-426-4435) for life saving, 24/7 advice as needed. For further review on decontamination and specific treatment, attendees are referred to a veterinary toxicology book for more detailed review.

Appropriate decontamination and therapy is indicated to improve the overall prognosis and outcome of the small animal poisoned patient. The use of decontamination, if and when appropriate, should be implemented to help prevent further toxicant absorption. Gastrointestinal (GI) decontamination (including emesis induction and/or administration of activated charcoal with a cathartic) is considered the best method of limiting absorption and preventing continued exposure to potential toxicosis in veterinary medicine. This is particularly beneficial with potentially harmful or life-threatening ingestions. It is imperative, however, to consider whether decontamination is appropriate, as it may be too late or contraindicated (resulting in potentially further harm). Evaluation of the potential risk associated with induction of emesis needs to be considered. Five key mistakes to avoid in the poisoned patient include:

1. Not obtaining an appropriate toxicology history
2. Not triaging the poisoned patient appropriately
3. Not knowing the indications or contraindications for emesis induction
4. Using the wrong emetic agent to induce emesis with
5. Not knowing more about activated charcoal

NOT OBTAINING AN APPROPRIATE TOXICOLOGY HISTORY

One of the first mistakes made in the field of veterinary toxicology is not taking the time to obtain an appropriate toxicology history. Some key questions to ask prior to consideration for emesis induction include:

- What was the product ingested? Do you know the active ingredient?
- Can you bring me the original box/container/pill vial?
- How many total tablets could have been ingested? What was the minimum and maximum amount that your pet could have been exposed to?
- Was this an extended- or sustained-release product? Was there an extra “letter” behind the brand name (e.g., Claritin vs. Claritin-D)?
- When did your pet get into this?
- Has your pet shown any clinical signs yet?
• Did you give your pet anything at home (e.g., hydrogen peroxide, salt, milk) when you found out he was poisoned?

**NOT TRIAGING THE POISONED PATIENT APPROPRIATELY**

The second important consideration is to make sure that pet owners are instructed to do the following:

• Safely remove their pet from the area of poisoning so additional ingestion does not occur
• Do not give any home remedies found circulating on the Internet (e.g., milk, peanut butter, oil, grease, salt)
• Do not induce emesis without consulting a veterinarian or the ASPCA animal poison control center first.
• Bring the pill vial, bait station, or container in to the veterinarian so they can assess the bottle for verification of the product name and/or active ingredient.
• Have the pet owner call the original pharmacy to find out how many total pills were prescribed, and attempt to back-count how many were taken/ingested.
• Seek immediate veterinary attention.
• Provide adequate ventilation (e.g., rolling down the windows, turning on the air conditioner) if emesis occurs with zinc phosphide toxicosis as the phosphine gas is also poisonous to humans.

Once the poisoned patient is presented to the clinic, veterinarians should do the following:

• Re-verify the spelling of the product and confirm the active ingredient (AI).
• Evaluate if the product is a sustained-release (SR), extended-release (XR), or long-acting (LA) product. These initials will follow the name of the drug on the vial.
• Evaluate whether the patient should have emesis induced (see “Not knowing the indicators or contraindications for emesis induction”).
• Stabilize the patient based on triage and physical examination findings (e.g., temperature, heart rate, pulse rate, pulse quality).
• Call for medical assistance and toxicology advice if needed.

**NOT KNOWING THE INDICATIONS OR CONTRAINDICATIONS FOR EMESIS INDUCTION**

The goal of decontamination is to inhibit or minimize further toxicant absorption and to promote excretion or elimination of the toxicant from the body. Decontamination can only be performed within a narrow window of time for most substances; therefore, it is important to obtain a thorough history and time since exposure to identify whether decontamination is safe for the patient or if it will actually be beneficial for the patient. Decontamination categories may include ocular, dermal, inhalation, injection, GI, forced diuresis, and surgical removal to prevent absorption or enhance elimination of the toxicant.

One of the primary ways of decontaminating veterinary patients is via emesis induction. While gastric lavage is often more effective at removing gastric contents, it is less often performed in veterinary medicine as it requires intravenous (IV) catheter placement, sedation, intubation with an appropriately inflated endotracheal tube (ETT), and appropriate gavage technique. Veterinarians should be aware of which circumstances are appropriate for emesis induction versus gastric lavage, and be aware of contraindications for emesis induction.

**Inappropriate Timing of Decontamination (See Table 1)**

Emesis induction should only be performed with recent ingestion of a toxicant or unknown time of ingestion in an asymptomatic patient. The more rapidly emesis is induced post ingestion, the greater yield of recovery of gastric contents. Studies have shown that gastric recovery within 1 hour after toxin
ingestion was approximately 17% to 62%. When emesis was induced within an even shorter time span (within 30 minutes), mean recovery of gastric contents was approximately 49% (range 9–75%). If several hours have elapsed since ingestion, the contents have likely moved out of the stomach and emesis will no longer be of benefit.\textsuperscript{1,2} While delayed emesis may still sometimes be successful, the amount of gastric recovery significantly decreases as time passes. That said, induction of emesis can be performed in asymptomatic patients up to 4 hours post ingestion, particularly with certain toxicants.\textsuperscript{1,2}

In certain circumstances, delayed emesis induction can be performed within 4 to 6 hours of ingestion provided the patient remains asymptomatic with the following circumstances: when certain toxins that delay gastric emptying are ingested (e.g., salicylates, opioids, anticholinergics, tricyclic antidepressants) or if the toxin is known to physically stay in the stomach for a longer duration of time or form a large bezoar or concretion (e.g., iron tablets, a large amount of chewable multivitamins, bone or blood meal). Additional examples include:

- Large wads of xylitol gum
- Large amounts of chocolate
- Grapes and raisins
- Foreign material (e.g., sawdust/wax, kitty litter, bone meal)

**Not Knowing the Contraindications for Emesis Induction**

Certain animals with underlying medical concerns should not have emesis induced (particularly at home by the pet owner) due to a higher risk of aspiration pneumonia or secondary complications. Examples include a prior history of laryngeal paralysis, megaesophagus, aspiration pneumonia, and upper airway disease. Likewise, certain species and breeds may limit our ability to perform emesis induction. Most dogs, cats, ferrets, and potbelly pigs can be safely induced to vomit.\textsuperscript{3} Certain breeds (e.g., pug, English bulldog, Shih-Tzu) with brachycephalic syndrome (e.g., elongated soft palate, stenotic nares, everted saccules, and a hypoplastic trachea) may be better candidates for sedation and gastric lavage rather than emesis induction due to the risks of aspiration pneumonia.\textsuperscript{1} Rabbits, ruminants (e.g., sheep, cattle, llamas, and goats), horses, birds, and rodents (e.g., chinchillas, rats, gerbils) cannot safely have emesis induced or may not anatomically be able to vomit.\textsuperscript{3}

Likewise, there are certain toxic ingestions where emesis should never be induced. Emesis should not be performed when agents such as caustic or corrosive substances (e.g., undiluted drain cleaners, toilet bowl cleaners, hydrochloric acid, concentrated sodium hypochlorite, lye products) are ingested. These agents can result in further burns and corrosive injury to the stomach, esophagus, and mouth when vomiting occurs after ingestion. In addition, if hydrocarbons and petroleum distillates (e.g., gasoline, mineral spirits, fuel, kerosene, furniture polish oils) are ingested, emesis should never be induced. These low viscosity liquids are very easy to aspirate when the patient vomits; therefore, emesis is contraindicated due to the high risk of aspiration.

**Induction of Emesis in the Symptomatic Patient**

Patients that are already symptomatic for the toxicosis should never have emesis induced. Certain toxicoses may result in severe sedation, a decreased gag reflex, or reduce the seizure threshold, increasing the risk for aspiration pneumonia during emesis induction. Patients with a lowered seizure threshold have the potential to develop seizures during emesis induction. As the patient is already symptomatic, the toxin has likely been already absorbed, and emesis induction is typically unrewarding.
**USING THE WRONG EMETIC AGENT TO INDUCE EMESIS WITH**

Emetic agents work by causing local gastric irritation, stimulating the central nervous system (CNS) chemoreceptor trigger zone (CRTZ), or a combination of gastric irritation and CNS stimulation.\(^1\)\(^2\)

Considerations in choosing an emetic agent are broad and varied. Many home or Internet remedies are used without success and have the potential of causing further harm. Emetic agents are not effective if an antiemetic such as ondansetron or maropitant has been previously administered. Currently, the only home recommendation for dog owners is hydrogen peroxide, while veterinary-prescribed emetic agents include apomorphine hydrochloride (dog) and xylazine hydrochloride (cat).\(^1\)\(^2\)

Hydrogen peroxide (H\(_2\)O\(_2\)) works by local irritation of the oropharynx and gastric lining, which results in a gag reflex. It is usually recommended for oral administration by the dog owner when transportation to a veterinary clinic is delayed. Only a 3% hydrogen peroxide solution should be used, as higher concentrations can potentially be corrosive to the GI mucosa. Adverse effects associated with use of H\(_2\)O\(_2\) as an emetic agent include irritation to the GI tract, gastroduodenal lesions, gastric dilatation and/or volvulus (dogs), and potential for aspiration pneumonia.\(^1\)\(^2\)\(^4\) When using hydrogen peroxide as an emetic agent in dogs, the administration of sucralfate and antacids (e.g., proton-pump inhibitors or H\(_2\) blockers) should be considered. Hydrogen peroxide is not a reliable emetic in cats and its use generally is NOT recommended in this species. In addition, cats can develop profound clinical signs from the administration of H\(_2\)O\(_2\), including profuse foaming from the mouth and severe hemorrhagic gastritis.

Apomorphine hydrochloride is a centrally acting emetic agent. Administration results in stimulation of the CRTZ, quickly followed by emesis. Adverse effects associated with apomorphine administration are prolonged emesis and ocular irritation when administered subconjunctivally.\(^1\)\(^2\) Apomorphine should not be used in cats, as it is not considered to be effective. Apomorphine should not be used when there has been ingestion of medications that result in compounding of symptoms (e.g., respiratory or CNS depression) or with antidopaminergic drugs (e.g., metoclopramide) that prevent emesis from occurring.

Dexmedetomidine and xylazine hydrochloride, alpha adrenergic agonists, are centrally-acting emetic agents that are used as emetic agents in cats. The use of apomorphine and hydrogen peroxide are not recommended for cats, as they are ineffective or can result in severe adverse effects (e.g., hemorrhagic gastritis), respectively. Xylazine does not reliably produce an emetic response in dogs, and thus is not recommended in dogs as an emetic agent. Adverse effects associated with alpha-adrenergic drugs include bradycardia, sedation, tremors, and respiratory depression.\(^1\)\(^2\) Thawley and Drobotz found that dexmedetomidine (7 mcg/kg, IM) resulted in emesis approximately 80% of the time in cats, as compared to only about 44% of the time in cats with xylazine.\(^5\) A similar study by Willey et al supported this.\(^6\) Alpha adrenergic agonists should not be used in cats that have ingested medications (e.g., other alpha-adrenergic agonist drugs) or products that may result in compounding of bradycardia, respiratory depression, sedation, or CNS depression symptoms.\(^1\)\(^2\)

Methods that are not recommended for emesis induction include digital induction of emesis, syrup of ipecac, liquid soaps, dry mustard powders, and salt. Digital induction of emesis often results in physical injury to the pet owner (dog bite), or injury to the pet’s throat and soft palate. Syrup of ipecac has historically been recommended to induce emesis, but is no longer the standard of care. Its cardiotoxic potential and tendency to result in prolonged vomiting, lethargy, and diarrhea have caused it to fall out of favor in both human and veterinary medicine.\(^1\)\(^2\) Soaps, mustard powders, and table salt are not reliable as induction agents and may be detrimental (e.g., resulting in further complications such as hypernatremia of the patient).
NOT KNOWING MORE ABOUT ACTIVATED CHARCOAL
After an appropriate history, triage, physical exam, and initial decontamination procedures have been performed in the poisoned pet, the next step is the administration of activated charcoal (AC), if appropriate. Activated charcoal should not be given to the poisoned patient when the toxicant does not reliably bind to AC (see below) or when it is contraindicated to administer AC (e.g., salt toxicity, poor gag reflex). In addition, symptomatic patients who are at risk for aspiration pneumonia should not be administered AC orally. Finally, the administration of AC with a cathartic should be cautiously used in dehydrated patients due to the potential (albeit rare) risks for hypernatremia secondary to free water loss in the GI tract.

When administering AC, it should ideally be given within < 5 minutes of ingestion to be most effective. In veterinary medicine, this is almost impossible due to driving time (to the clinic), lapsed time since ingestion, time to triage, and the amount of time it takes to physically deliver AC (e.g., syringe feeding, orogastric tube). As a result, administration of AC is often delayed for up to an hour or more. As time since ingestion is often unknown (e.g., pet owner coming home from work to find their pet poisoned), decontamination (including emesis and administration of AC) is often a relatively benign course of action, provided the patient is not already symptomatic. As always, when administering any drug, it is important that benefits outweigh the risks, and that complications be prevented when possible. In veterinary medicine, administration of AC with a cathartic as long as 6 hours out may still be beneficial with certain types of toxicosis, particularly if the product has delayed release [e.g., extended release (XR) or sustained release (SR)] or undergoes enterohepatic recirculation (see multi-dose AC below). While human medicine has moved away from administration of AC with poisoned patients, the aggressive use of AC in veterinary medicine is still warranted, as this is often our last line of defense when it comes to adequately decontaminating our patients. Certain modalities of therapy—e.g., antidotes [such as fomepizole, pralidoxime chloride (2-PAM), digoxin-specific antibody fragments], plasmapheresis, hemodialysis, mechanical ventilation—along with financial limitations of pet owners, limit our ability to treat poisoned pets aggressively as compared to human medicine. As a result, the continued use of AC in veterinary medicine is still warranted as a first line of defense therapy. Current recommended dosing for single dose AC is 1–5 g of AC/kg with a cathartic (e.g., sorbitol) to promote transit time through the GI tract.

Administration of Activated Charcoal When the Toxicant May Not Bind Appropriately
Before administering AC and a cathartic, it is imperative to consider whether or not the patient has a contraindication for its administration. Contraindications for AC administration include severe sedation, decreased gag reflex, or intestinal obstruction. Likewise, if the toxicant does not physically bind to AC, it is contraindicated to administer AC. Examples of toxicants that do not absorb reliably to AC include ethylene glycol, alcohol, xylitol, and heavy metals. Contraindications for cathartic administration include hypernatremia, dehydration, and salt toxicosis (e.g., salt, ice melters, homemade play dough), as fluid loss through the intestinal tract can result in excessive free water loss and severe, secondary hypernatremia.

Multi-dose Activated Charcoal
Human studies have found that multi-dose AC significantly decreases the serum half-life of certain drugs, including antidepressants, theophylline, digitoxin, and phenobarbital. While veterinary studies are lacking, there is likely an added benefit from using multi-dose AC, provided the patient is well hydrated and monitored appropriately. Certain situations or toxicities, including drugs that undergo enterohepatic recirculation; drugs that diffuse from the systemic circulation back into the intestinal tract down the concentration gradient; or ingestion of SR, XR, or long-acting (LA) release products will require
multi-dose administration of AC. Keep in mind that when administering multiple doses of AC to a patient, the additional doses ideally should not contain a cathartic (e.g., sorbitol), due to increased risks for dehydration and secondary hypernatremia. Current recommended dosing for multiple doses of AC is 1–2 g of AC without a cathartic /kg of body weight, PO q 4–6 hours for 24 hours.

Contraindications of Activated Charcoal
Contraindications for AC include endoscopy (which would obscure visualization), abdominal surgery of the GI tract, gastric or intestinal obstruction, gastrointestinal hemorrhage or perforation (due to pathology, caustic injury, etc.), recent surgery, late-stage presentation with clinical signs already present, dehydration, lack of borborygmi, ileus, hypernatremia, hypovolemic shock, compromised airway (risk for aspiration pneumonia), and ingestion of a caustic substance or hydrocarbon (due to increased risk for aspiration pneumonia). In patients that have an unprotected airway that are at risk for aspiration pneumonia (e.g., a depressed state of consciousness, excessive sedation), the use of AC is contraindicated without ETT intubation (to protect the airway during gastric lavage and AC administration).

CONCLUSION
The appropriate and careful use of decontamination of the poisoned patient should be considered. Thorough history taking and physical examination of the patient is imperative prior to emesis induction. Recognizing contraindications for emesis induction, or which emetic to use for emesis induction, is imperative. With careful and thorough evaluation of the poisoned patient, proper decontamination can be performed confidently with safety and efficacy to aid in ensuring a positive outcome.

REFERENCES

**NOTE:** When in doubt, all drug dosages should be confirmed and cross-referenced with a reference guide such as Plumb’s Veterinary Drug Handbook.
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<th>WHEN EMESIS SHOULD BE PERFORMED</th>
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<tr>
<td>With recent ingestion (&lt;1-2 hours) in an asymptomatic patient</td>
<td>With caustic or corrosive toxicant ingestion (e.g., batteries, ultra-bleach, lye, oven cleaning chemicals), where emesis induction may result in further injury to the oropharynx, esophagus, and GIT when these agents are expelled.</td>
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<td>With unknown time of ingestion in an asymptomatic patient</td>
<td>When petroleum distillates or hydrocarbons are ingested (e.g., kerosene, gasoline, motor oil, transmission fluid, etc.); these toxicants can be easily aspirated into the respiratory system and result in severe aspiration pneumonitis.</td>
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<td>When ingestion of a product known to stay in the stomach for a long time is ingested in an asymptomatic patient (e.g., bezoar, massive ingestions, grapes/raisins, chocolate, wads of xylitol gum, FBO, etc.)</td>
<td>In symptomatic patients that have a decreased gag reflex (e.g., sedation, coma, hypoglycemia, etc.) or a lowered seizure threshold (e.g., tremoring, seizuring, etc.) that may be unable to protect their airway, resulting in aspiration pneumonitis.</td>
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<td>In patients with underlying medical conditions that may predispose them towards aspiration pneumonitis or complications associated with emesis induction (e.g., megaesophagus, history of aspiration pneumonia, upper airway disease, laryngeal paralysis). Brachycephalic breeds (e.g., English bulldog, pug, Shih-Tzu) with an elongated soft palate, everted saccules, a hypoplastic trachea, or stenotic nares may be better candidates for sedation, intubation, and gastric lavage rather than emesis induction due to the risks of aspiration.</td>
<td>Species that anatomically cannot vomit or cannot safely have emesis induced such as birds, rabbits, ruminants (e.g., sheep, cattle, llamas, and goats), horses, and rodents (e.g., chinchillas, rats, gerbils).</td>
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