

Decontamination
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Prevention is the best way to decrease pet poisonings, but even with precautions in place, accidental poisonings happen every day. The management of poisoning cases generally consists of decontamination and symptomatic and supportive care because very few antidotes are available, and those that are available can be cost prohibitive or difficult to obtain.

Decontamination is the process of removing a toxicant from a pet to reduce its absorption or enhance its elimination, thus minimizing or even preventing clinical signs from developing. The most common types of decontamination in dogs and cats are oral/gastric, dermal, ocular, and inhalation.

Before proceeding with decontamination, consider the following guidelines:

- Assess the pet.
- If the pet is stressed or symptomatic, stabilize first and then decontaminate if necessary.
- Take a pet poison history. Each poison case varies depending on the pet's species, breed, age, weight, and health history; agent(s) involved; amount ingested; and duration of exposure.
- Decontamination is not required for all poison exposures.
- Be aware of the public health risks associated with certain agents such as pepper spray, organophosphate insecticides, zinc/aluminum phosphide rodenticides, and irritating/corrosive substances, which can pose a risk to veterinary staff.
- Apply personal protective equipment (PPE), such as protective clothing (impermeable gloves and apron), protective eyewear (goggles, face shield), and respiratory protection (surgical mask). PPE needed will depend on the substances involved.
- Remove contaminated items from the pet as well as items used in transport (collar, towels, blankets).
- Decontaminate in a well-ventilated area.
- When in doubt, the toxicology professionals at an animal poison control center can assist veterinary staff or clients with the decontamination process.

ORAL AND GASTRIC DECONTAMINATION

Oral and gastric decontamination is the process of removing a toxicant from the gastrointestinal tract through oral rinsing; dilution; induction of emesis; lavage; the use of adsorbents, cathartics, and enemas; or removal via endoscopy or gastrotomy.

Oral rinsing

- Oral rinsing is the process of rinsing or flushing the mouth with water to remove or decrease the amount of toxin ingested or absorbed through the mucous membranes, reducing systemic toxicity.
- Depending on the toxin, the mouth should be rinsed with tepid water for at least 5 to 10 minutes.
- The mouth can be rinsed using a garden hose, a rinse attachment for a sink, or a detachable shower nozzle. It is best not to squirt the water directly into the back of the throat because of the risk for aspiration. The water source should be positioned at the commissure of the lips and directed rostrally.

- Oral rinsing is also used when a pet has developed a taste reaction after licking a bitter tasting product such as a glow stick. Offering a small amount of water, milk, canned food, or juice drained from canned tuna or chicken helps rinse a bad taste out of the pet's mouth.
- **Contraindications and risks.** Oral rinsing should not be performed in a pet that cannot swallow or that is unstable (e.g., experiencing tremors, seizures, or dyspnea; obtunded; recumbent), unless an endotracheal tube is in place to prevent aspiration.

Dilution

- Dilution is indicated when an irritating or corrosive substance such as an alkaline or acidic product (detergents, batteries, cleaners) has been ingested.
- Offering a demulcent, such as milk or plain yogurt, can soothe and relieve irritation of the mucous membranes; demulcents form a protective film in the mouth.
- **Contraindications and risks.** A diluent should not be offered to a pet that is vomiting, has an increased risk for aspiration (cannot swallow or control airway; is brachycephalic), or is unstable (as described above).

Emesis

- Emesis is the process of removing a substance from the stomach through vomiting.
- Generally, it's most effective within 30 to 90 minutes after ingestion, but this time frame depends on the substance ingested. Some toxins act extremely fast and the onset of signs can develop minutes after exposure, making emesis contraindicated.
- Whether at home or in the clinic, it is best to have the pet vomit in an area that is well lit and easy to clean, such as tile, wood, or concrete flooring.
- All emetics are more effective if the pet eats a small meal first.
- Generally, 40% to 60% of stomach contents are expected to be returned by emesis.
- It is important to note the number of times the pet vomits, the amount of toxic substance, and the presence of food, bile, blood, or other foreign material.
- The vomit should be cleaned up immediately to prevent re-exposure.

Emesis using H₂O₂ in dogs

- Emesis can be performed by veterinary staff or the client at home using fresh (bubbly and nonexpired) 3% hydrogen peroxide (H₂O₂). H₂O₂ is the safest over-the-counter emetic; it works by bubbling against the stomach lining, which causes local irritation, and producing oxygen, which stretches the stomach.
- The recommended dosage for H₂O₂ is 1 mL/lb body weight but should not exceed 45 to 50 mL, even if the pet exceeds 100 lb.
- H₂O₂ can be administered directly with a medicine dropper or turkey baster, or it can be mixed with milk, peanut butter that does not contain xylitol, or low-sodium chicken or beef broth to entice voluntary ingestion.
- Vomiting usually occurs within 10 to 15 minutes, and the dose can be repeated once if emesis is not initially successful.
- Light activity between doses increases the effectiveness of H₂O₂.
- **Adverse effects** such as protracted vomiting, gastritis, and hematemesis are generally the results of overdosing.

Emesis using apomorphine in dogs

- Apomorphine can be a first-choice emetic in dogs that are in the clinic or if H₂O₂ is unavailable.

- Apomorphine is a centrally acting emetic that stimulates the dopaminergic receptors in the chemoreceptor trigger zone (CRTZ). It can be administered by the IV, IM, or conjunctival route.
- The recommended dosage for IV and IM routes is 0.02–0.04 mg/kg. Emesis occurs almost immediately after IV injection and usually within 5 minutes after IM injection.
- For conjunctival administration, a portion of an apomorphine tablet can be crushed and dissolved in a few drops of saline. Emesis generally occurs within 4 to 6 minutes; once the pet vomits, the conjunctival sac should be flushed with saline to prevent protracted vomiting.
- **Adverse effects** include central nervous system (CNS) and respiratory depression, protracted vomiting, and, rarely, CNS stimulation. Naloxone can be used to reverse the CNS and respiratory effects of apomorphine but will not block the emetic effect.

Emesis using xylazine in cats

- Xylazine is an alpha₂-adrenergic agonist and the recommended dosage is 0.44–1 mg/kg IM or SC, and emesis generally occurs within 5 minutes.
- Adverse effects can include CNS and respiratory depression, hypotension, and bradycardia.
- These effects, along with the emetic effects, can be reversed with yohimbine, an alpha₂-antagonist, at 0.1 mg/kg IM, SC, or IV.

Emesis using dexmedetomidine in cats

- Dexmedetomidine is an alpha₂-receptor-specific agent and the recommended dosage is 7 mcg/kg IM (median dosage, 0.96–10 mcg/kg) and 3.5 mcg/kg IV.
- Sedative and emetic effects can be reversed with an equal volume of atipamezole given via the same route as the dexmedetomidine.

Emetics to avoid in cats

- H₂O₂ is not recommended in cats because they are more likely to develop gastritis, which can often be bloody.
- Apomorphine is poorly effective in cats because cats' CRTZ receptors differ from those in dogs, and apomorphine may also result in CNS stimulation.

Emetics to avoid in dogs and cats

- Dish soap is not recommended because of the risk for aspiration pneumonia and severe respiratory effects if the pet inhales the soapy bubbles.
- Syrup of ipecac was removed from the market and is no longer recommended because vomiting can be delayed up to 40 minutes and it has been reported to cause cardiac issues in humans.
- Powdered mustard should be avoided because it can be irritating to the GI tract and is generally not effective.
- Salt and baking soda (sodium bicarbonate) because of the risk of increasing the sodium level in the body (hyponatremia). Hyponatremia can lead to central nervous system (CNS) signs such as ataxia, tremors, and seizures, which can put the pet more at risk.

Contraindications and risks with emesis in dogs and cats

- Emesis should not be induced in pets that have ingested a strong alkali, acid, or other highly corrosive material. Emesis with these agents can re-expose the mouth and esophagus, which can lead to ulceration, perforation, and scarring.

- Emesis should not be induced if the pet has ingested hydrocarbons or petroleum distillates (kerosene, paint thinner, solvents, lighter fluid) because these agents are easily aspirated into the lungs.
- Emesis should not be induced in a pet that is already vomiting or exhibiting clinical signs such as agitation, disorientation, ataxia, obtundation, dyspnea, seizures, recumbency, or coma. If the pet is symptomatic, the poison has taken effect and decontamination is inappropriate and can cause further complications (aspiration pneumonia).
- Pets with preexisting health conditions, such as seizures, cardiovascular disorders, recent abdominal surgery, megaesophagus, or collapsing trachea, and in brachycephalic breeds with known breathing issues, emesis should be induced only under the supervision of a veterinarian because these conditions can make vomiting hazardous. The veterinarian must weigh the benefits of emesis against the risks.
- Extreme caution should be taken when emesis is induced in a pet that has ingested a zinc phosphide-based rodenticide. In these cases, emesis should be performed in a well-ventilated area or outside because of the emission of phosphine gas, which is also toxic to humans.

Gastric lavage

- Gastric lavage is used to remove ingested toxins from the stomach by irrigation and may be necessary if emesis is unsuccessful or contraindicated.
- Gastric lavage can be considered in symptomatic pets that are extremely sedate, unconscious, recumbent, or seizing or that have other health concerns, such as a recent abdominal surgery, that increase the risk associated with emesis induction.
- Gastric lavage can also be considered when the pet has ingested material that is large in size (but not larger than the diameter of the lavage tube) or has formed a concretion in the stomach (e.g. iron tablets or large amounts of chocolate) or capsules/tablets approaching a lethal dosage (e.g. calcium channel blockers, beta-blockers, baclofen, organophosphate and carbamate insecticides).
- During lavage, the pet should be anesthetized unless comatose, and a cuffed endotracheal tube should be placed to protect the airway and prevent aspiration. A large-bore gastric tube with a fenestrated end should be lubricated and inserted into the stomach no farther caudal than the xiphoid process. Body temperature water (5–10 mL/kg) should be instilled using the gravity method, and the flushing process should be repeated multiple times with copious amounts of water until the lavage fluid runs clear. The pet's head should be kept lower than the chest and the gravity method used for fluid recovery. The contents should be emptied in a bucket and examined for evidence of the toxic substance.
- Activated charcoal can be instilled directly into the stomach after gastric lavage has been completed. The free end of the tube should be kinked before being removed to help prevent aspiration.
- **Adverse effects** with gastric lavage include mechanical injury to the mouth, throat, esophagus, or stomach; hypothermia; and the instillation of fluid into the lungs.
- **Contraindications and risks** include ingestion of corrosive substances, because of the risk for esophageal or gastric perforation from the tube placement; hydrocarbons, because of the risk for aspiration; and sharp objects.

Activated charcoal

- Activated charcoal (AC) is an adsorbent that binds to most organic compounds, reduces their absorption into the systemic circulation, and facilitates their excretion in the feces.

- AC is beneficial when emesis cannot be induced and for toxins that undergo enterohepatic recirculation.
- AC comes in powder, gel, and liquid formulations; the recommended dosage is 1–3 g/kg.
- Tablets and capsules found in stores are not likely to be as effective as commercially prepared medical products.
- Activated charcoal can be administered orally with a large syringe or a stomach tube while the pet is anesthetized, and an endotracheal tube is in place to prevent aspiration.
- AC can also be mixed with a small amount of canned food to make it palatable for voluntary ingestion, but this does slightly decrease its effectiveness.
- Repeated doses can be given every 4 to 8 hours at half the original dose when enterohepatic recirculation is known to occur.
- Additional doses should not contain a cathartic because of the increased risk for dehydration via fluid loss from the GI tract.
- Adverse effects include vomiting, hypernatremia, and aspiration. Pets should be monitored for evidence of aspiration and hypernatremia for at least 4 hours after administration of AC.
- The use of antiemetics should be considered before administering AC, especially if the pet is vomiting from induction of emesis.
- **Contraindications and risks.** Activated charcoal should not be administered to pet that are actively vomiting or that have ingested a caustic material, hydrocarbons, or agents that are known to have excess sodium (sodium bicarbonate, Play-Doh) or that are osmotically active (gummy candies, artificial sweeteners, paintballs, glycerol). AC does not bind to all compounds equally, so it should not be administered to pets that have ingested heavy metals, xylitol, ethanol, or fertilizers.

Cathartics

- Cathartics enhance the elimination of a substance by increasing the speed and transit time of the GI tract. The use of cathartics alone in the management of a poisoned pet is no longer recommended or beneficial. Mineral oil is no longer recommended as a lubricant cathartic in dogs and cats because it has a higher risk of pulmonary aspiration. The three types of cathartics used in dogs and cats are bulk, osmotic, and saline cathartics.
- **Bulk cathartics** use a high fiber content to retain water and produce bulkier stools. Common bulk cathartics include psyllium (Metamucil [no flavors or artificial sweeteners]), plain canned pumpkin (no spices or sweeteners), and whole-wheat bread (no nuts or raisins).
- **Osmotic cathartics** pull electrolyte-free water into the GI tract, which increases the fluid volume, stimulating GI motility. A saccharide osmotic cathartic such as sorbitol is commonly combined with AC. Sorbitol can be given at 1–2 mg/kg using a 70% solution. Adverse effects from sorbitol include vomiting, dehydration, secondary hypernatremia, abdominal cramping or pain, and possibly hypotension.
- **Saline cathartics** draw fluid into the intestines through osmosis, which increases the fluid content of feces, thus causing intestinal distention and promoting peristalsis. Saline cathartics can be administered along with or shortly after AC in order to move the AC through the gastrointestinal tract. Saline cathartics, such as sodium sulfate (Glauber's salts) and magnesium sulfate (Epsom salts), can be given at 250 mg/kg.

- **Adverse effects** with the use of magnesium sulfate have led to hypermagnesemia in some cases, which presents as CNS and cardiovascular depression. Saline cathartics should not be administered to pets with renal insufficiency.
- **Contraindications and risks.** Saccharide and saline cathartics should not be administered to pets with diarrhea, dehydration, electrolyte imbalances, ileus, or intestinal obstruction or perforation. Electrolytes should be monitored very closely for any disturbances with the administration of saccharide and saline cathartics because fluid shifts can occur.

Enemas

- Enemas are helpful when elimination of toxicants from the lower GI tract is desired (raisins, extended-release medications). Warm water or warm soapy water at 10 mL/lb and dioctyl sodium sulfosuccinate (DSS) single-use syringes (250 mg/12 mL; dogs and cats) are enemas that can be used to move medication and other toxins quickly through the colon and lessen additional systemic effects.
- **Contraindications and risks** Enemas should not be administered to pets with diarrhea. Phosphate enemas should be avoided (especially in cats) because of the risk for electrolyte and acid–base disturbances.

Endoscopy and Gastrotomy

- Endoscopy requires general anesthesia and a thin flexible endoscope to remove coins, batteries, toys, and other items before they can pass out of the stomach. If endoscopy is not available, the objects can be removed by gastrotomy. Gastrotomy is a surgical procedure to remove objects from the stomach that are corrosive (e.g., batteries), form bezoars (e.g., iron tablets), expand and cause a foreign body obstruction (e.g., Gorilla glue), or continue to seep their toxic effect into the body (e.g., zinc pennies; fentanyl or nicotine patches).
- **Contraindications and risks.** Surgery should not be performed until the pet is stabilized. Prior to anesthesia, emesis should be controlled with antiemetics, the pet should be properly volume resuscitated with IV fluids, and electrolyte, glucose, or acid-base imbalances corrected. Prior to surgery, radiographs should also be obtained to verify the presence of the agent or a foreign body obstruction; keep in mind, not all agents are radiopaque.

DERMAL DECONTAMINATION

Dermal decontamination involves removing a substance from the fur and skin without using any harsh chemicals or solvents, which can further irritate and damage the skin. The goals of dermal decontamination are to prevent transdermal absorption and oral re-exposure from the pet grooming itself. Dermal exposures can involve a variety of agents, including greasy and oily substances, sticky materials, irritating or corrosive products, dry substances, and skunk spray. Dermal exposures can also happen when an owner applies drops, sprays, ointments, or other substances directly to the pet. Pets should not ingest substances used in dermal decontamination (soap, oils, skunk-off mixture) because they can cause gastrointestinal upset.

Greasy and oily substances

- Greasy and oily substances include herbicides, topical spot-on insecticides, glow sticks, and essential oils.

- To remove a greasy or oily substance, bathe the pet with a liquid dishwashing soap used for hand-washing dishes (Dawn, Joy; us.pg.com).
- Wet the pet thoroughly with warm water, apply the soap, lather, and rinse thoroughly.
- The bath can be repeated until the product's residue/odor has been significantly decreased or eliminated.
- Towel-dry the pet and keep it in a warm environment or wrap the pet in a blanket to prevent chilling.
- The pet's body temperature should be monitored closely because the bathing process can have a cooling effect and the pet may become hypothermic.
- Clinical signs, such as tremors, may worsen if the pet shivers from being cold, so provide thermoregulation and heat support if needed.
- **Cautions and contraindications.** Do not use dishwashing detergents used in electric dishwashers to bathe pets because these are too harsh for the skin; also avoid shampoos containing insecticides, antifungals, antibiotics, and coal tar. Avoid pet shampoos because they are typically insufficient to remove oil-based products and clinical signs may persist from continued absorption, despite medical treatment.

Sticky substances

- Sticky substances can include tar, asphalt, sap, oil-based paint, glue, wax, and insect glue traps.
- To remove a sticky substance from the fur, the sticky bond must be softened. Oils such as butter/margarine, vegetable/olive oil, peanut butter, or mineral oil can be applied and worked into the fur. The sticky substance generally dissolves into pliable, gummy balls that can be combed or picked out using your fingers. Some substances may require the oil to sit on the fur for 5 minutes.
- Once the sticky substance is removed, the oil can be washed off using liquid dishwashing soap. Insect and rodent glue traps can be removed using the same method, but also apply baby powder, cornstarch, or paper towels to any remaining sticky areas on the traps to prevent further attachment to the fur or skin.
- Substances such as super glue or paint may not come off with appropriate dermal decontamination. Once dry, these substances pose a low risk for toxicity and can be allowed to wear off naturally.
- Leaving the substance on the fur may concern some owners, in which cases the fur may be clipped or shaved. Clipping and shaving may also be necessary for long-haired pets or pets that cannot be bathed.
- **Cautions and contraindications.** Do not use harsh chemicals or solvents (paint thinner, acetone) to remove sticky substances from the fur because these products can be irritating and damaging to the skin.

Irritating or corrosive substances

- Irritating or corrosive substances can include fabric softener from unused sheets, liquid potpourri, electric dishwashing detergents, drain and oven cleaners, mineral spirits, and gasoline. To remove such substances, gently flush the pet's fur and skin with copious amounts of water for 15 to 20 minutes.
- **Cautions and contraindications.** Avoid any abrasive scrubbing or high-pressure sprays that may further traumatize the skin. Do not use neutralizing agents on the skin (applying an acid on an alkaline substance) as doing so may result in a chemical reaction that further damages the skin.

Dry substances

- Dry substances can include powders, dust, and granules. To remove these, the fur can be brushed or vacuumed before bathing with a mild liquid dishwashing soap. Vacuuming should take place in a well-ventilated area or outdoors. Some dry products may become clumped or sticky when water is added.

Skunk spray

- Skunk spray contains thiols that are responsible for the foul odor. Thiols are not water soluble and are difficult to remove, even with soap. To decrease the odor, the thiols must be converted into compounds that have little to no odor using a skunk-off mixture of 1 quart 3% hydrogen peroxide, ¼ cup baking soda, and 1 to 2 teaspoons liquid dishwashing soap. The baking soda catalyzes the oxidative ability of the peroxide, which then oxidizes the thiols into highly water-soluble sulfonates (sulfonic acid). For large dogs, 1 quart of water can be added to the skunk-off mixture to ensure complete coverage.
- Wet the pet thoroughly, apply the mixture, and work it into the fur. Allow the skunk-off mixture to sit on the fur for 5 minutes and then rinse thoroughly. This procedure can be repeated as needed.
- A bleaching effect may be noted on clothes, carpets, towels, and the pet's fur. Because the skunk-off mixture produces oxygen gas, bathe the pet in a well-ventilated area away from heat sources and open flames. Discard all unused mixture and do not store it in a closed container.

OCULAR DECONTAMINATION

The goal of ocular decontamination is to remove substances from the eyes and reduce ocular tissue damage. Ocular exposures can occur with solids, liquids, or gases. Substances can enter the eyes accidentally or intentionally through splashes, immersions, or instillations. Any substance not specifically formulated for the eyes can cause irritation, corneal abrasions or ulcerations, and blindness.

Flushing the eye

- To remove a substance, the eyes should be flushed for at least 20 to 30 minutes using sterile saline or tepid water. Eye flushing can be done using a bottle of sterile saline, a clean syringe without the needle, or an eye dropper. If these items are unavailable, use a clean washcloth or cotton ball to soak up and squeeze the flushing solution into the eyes. A small paper/plastic cup or a water bottle can also be used to rinse the eyes.
- Hold the item (dropper, cotton ball, cup) as close to the eye as possible, without touching the surface, and allow the saline or water to flow across the eye in a slow, steady stream. Flushing can be repeated with periods of rest for the pet and owner between flushings.
- **Cautions and contraindications.** High-pressure spray devices (detachable sink rinse or shower head) should not be used because the pressure is too high and may cause additional irritation or pain. Neutralizing agents, decongestant allergy eye drops, or redness relief eye drops (Visine) should not be used to rinse a pet's eyes. Ocular chemical burns are generally treated with lubricated ointments, but corticosteroid ointments should be used only if the corneal epithelium is intact. To prevent further injury to the eyes, do not allow the pet to rub or scratch the eyes.

Following up ocular exposures

- Any time an ocular exposure happens, it is best to follow up with an examination and fluorescein dye test to check for corneal damage.

INHALATION DECONTAMINATION

The goal of inhalation decontamination is to remove the pet from the substance and reduce further exposure. Substances likely to be inhaled include gases, smoke, toxic fumes, dusts, powders, and granules.

Removing the pet from the source and providing ventilation and/or oxygen

- Removing the pet from the source of exposure and providing adequate ventilation are generally sufficient methods of inhalation decontamination.
- Oxygen support should be provided for pets in respiratory distress.

Evaluating the pet after exposure

- Pets should be evaluated for respiratory changes, audible sounds, hypoxia, damage to the lining of the respiratory tract, and physical pulmonary injury.
- **Cautions and contraindications.** Certain agents, such as pepper spray or zinc/aluminum phosphine gas (toxic gas produced in a pet's stomach after eating mole/gopher bait), can pose a hazard for veterinary staff if inhaled. In these cases, decontamination should take place in a well-ventilated area or outside.