Household Cleaning Products

- Exposures to household cleaning products represent the most common exposures reported to poison information centers.
- Their frequency is attributable to the ubiquitous nature of the products and their easy accessibility to children.
- Accordingly, the majority (52.9 %) of all poisoning exposures involve children less than 6 years of age, and ingestion is the most frequent route.
- Although the number of exposures is high, the associated mortality rate is relatively low .
- The majority of fatalities were secondary to the aspiration of pine oil or the ingestion or inhalation of corrosive household cleaning products.

Table 129-2 -- The Most Common Household Cleaning Product Exposures

Bleach
Miscellaneous cleaners
Wall-floor-tile cleaners (acid/alkali)
Automatic dishwashing detergents
Glass cleaners
Laundry detergents
Disinfectants (pine oil) Hand dishwashing detergents
Toilet bowl cleaners
Drain cleaners
Cleansers
Carpet/upholstery cleaners
Oven cleaners
Laundry prewash stain removers
Ammonia cleaners

- There are no specific symptom complexes, or toxidromes, associated with the agents
- However, many general findings are consistent with exposure to household cleaning products.
- Characteristic odors can help confirm exposure to a specific chemical.
- For example, the failure to find the odor of bleach or ammonia on the breath or clothing combined with a lack of symptoms may provide sufficient evidence to rule out exposure to either product.

- All the household products are irritants.
- symptoms consistent with irritation of the oropharyngeal or respiratory mucosa.
- Gastrointestinal complaints, including abdominal discomfort, nausea, and vomiting, may be present and may be the result of prior home treatment–e.g., syrup of ipecac.
- Ocular, oral, and upper respiratory tract irritation may manifest as tearing, erythema, dyspnea, tachypnea, and general discomfort.

AMMONIA

- Ammonia is present in a variety of household cleaning products.
- the concentration is less than 5 per cent and usually in the range of 1-3 per cent.
- Household ammonia has a very pungent odor that discourages ingestion or inhalation.

- Ammonia-related effects are often milder than those caused by bleach, because the product is typically mixed in a large amount of water and the child may sample a dilute portion, which limits the potential for any pathophysiology.

- Chemical-related injuries included tongue, oropharyngeal, and esophageal burns as well as friable, erythematous tissue in the esophagus.

Clinical Presentation

- Oral mucosal and/or gastrointestinal chemical irritation.
- throat pain, drooling, dysphagia, oral blisters, and esophageal burns;
- Endoscopy revealed small ulcerated lesions accompanied by bleeding
- aspiration pneumonia and severe esophageal corrosive injury.
- mucosal irritation or vomiting secondary to the presence of anionic and nonionic surfactants in household ammonia-containing cleaning products

Household bleach

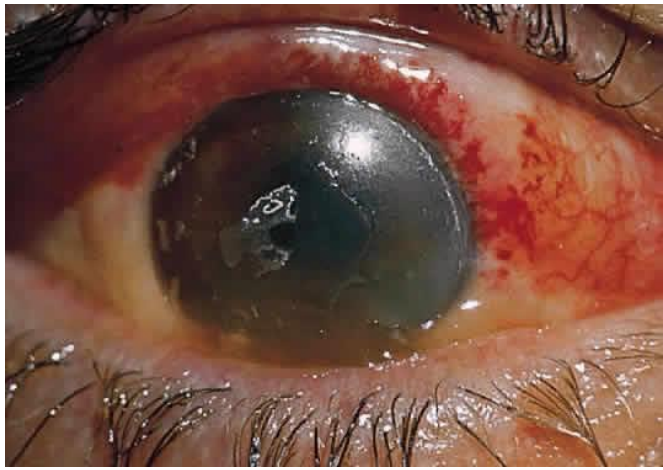
- a common laundry product that customarily contains sodium hypochlorite in a concentration of 5.25 per cent.
- The ingestion of small amounts by children is common. Liquid bleach is often measured in a cup or beverage container and children may drink either residue remaining in the cup or larger amounts.
- Ingestion of small amounts may cause minor oral mucosal or gastrointestinal chemical irritation,
- Metabolic acidosis and hypernatremia have been reported following the ingestion of 500 mL of a sodium hypochlorite-containing bleach.
- These systemic problems were attributed to the absorption of hypochlorous acid and excessive amounts of sodium.

Clinical Presentation

- Mucosal irritation resulting in nausea, vomiting, diarrhea, and abdominal pain may occur following ingestion.

- Factors that will affect the severity of clinical findings include:

1) volume
2) Viscosity
3) concentration of the agent,
4) gastric contents
5) duration of contact.



- Esophageal perforations or strictures are rare.

- Lacrimation, irritation, and burning with corneal edema are common following splash injuries to the eyes with bleach.

- Chemical pneumonitis may occur following aspiration, and these patients will potentially present with dyspnea, cough, wheezing, and strider if significant glottic edema exists.

DETERGENTS AND SOAPS

- The term detergent encompasses a wide variety of agents that include
  - ✓ laundry detergents
  - ✓ liquid hand washing
  - ✓ dishwashing products
  - ✓ automatic dishwasher detergents
  - ✓ and all-purpose cleaners.
  - ✓ Soaps

- Detergents may contain combinations of surfactants (usually anionic and nonionic organic substances), which lower the surface tension of water and allow it to wet or infiltrate debris more efficiently.

- Alkaline builders such as the sodium salts of phosphates, carbonates, and silicates allow soaps and detergents to work more effectively.

Pathophysiology

- Anionic and nonionic surfactants can produce emesis from their direct irritant effect, and were once investigated as an alternative to syrup of ipecac under the name of LEM (liquid emetic agent).

- Some detergent cleaners contain additives these include agents such as cationic surfactants that are known to be corrosive in concentrations exceeding 7.5 per cent

- Alkaline builders such as sodium phosphate, sodium carbonate, sodium silicate, and sodium metasilicate impart alkalinity and, if present in sufficient quantity, produce direct cellular irritation and necrosis.

- For example, a solution containing 0.5 per cent sodium metasilicate or more than 15 per cent sodium carbonate can produce corrosive injury.

- The granular consistency and the alkaline pH of these builders account for the fact that approximately 90 %of patients who suffer an ocular exposure to either dry or liquid automatic dishwashing detergent will have corneal irritation.

- Detergents and soaps may also contain a number of additives, including fragrances, coloring agents, whiteners, and softeners.

- Typically their concentrations are too low to result in clinically important toxicity. However, allergic reactions and sensitization may occur.

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Clinical Presentation

- The clinical features of detergent or soap exposure are generally mild and self-limiting.
- Nausea, vomiting, and diarrhea are common.
- inhalation of detergents by children may require evaluation. My produce upper respiratory tract edema with stridor, drooling, fever, and respiratory distress.
- Cationic detergents in concentrations greater than 7.5 %are capable of causing a serious corrosive injury to the gut, eye, or skin.
- Toxic manifestations after ingestion include vomiting, diarrhea, pulmonary edema, hypotension, and metabolic acidosis.
- Chemical dermatitis, conjunctivitis and ocular burns can result from dermal and eye exposure.

GLASS CLEANERS

- Glass or window cleaners used in the home typically contain one or a combination of the following

✓ isopropyl alcohol (3–6 per cent),

✓ glycol ethers such as ethylene glycol monobutyl ether (1–3 per cent),

✓ ammonium hydroxide (less than 1 per cent), and

✓ water (over 90 per cent).

- **Pathophysiology**
- Direct central nervous system depression has been described following the suicidal ingestions of large amounts of more concentrated products.

- It is converted in vivo to butoxy acetic acid, a substance that produces increased red blood cell fragility and subsequent red blood cell hemolysis.

- **Clinical Presentation**
- Ingestion of small amounts of non-methanol-containing glass cleaners would not be expected to result in any toxic manifestations.
- If large quantities are ingested for suicidal purposes, the patient may experience significant gastrointestinal irritation manifest as nausea, abdominal pain, and vomiting.
- Central nervous system depression may occur under these circumstances,
- The ingestion of a large amount could result in gastrointestinal tract irritation, abdominal pain and hematemesis as well as CNS depression.
- Isopropyl alcohol produces two to three times more CNS depression than ethanol.

Treatment

- The adages “treat the patient, not the poison” and “do no harm” prevail in the management of exposures to house hold cleaning products.

- Most exposures do not need any therapeutic intervention, including dilution.

- However, airway compromise may develop in small children from direct irritative effects of some substances, mandating appropriate airway and respiratory support.

Ingestion

- Most accidental exposures to bleach, ammonia, detergents, or glass cleaners will be limited to taste or mouthful amounts, and most of these products do not produce toxicity when the exposure involves such small amounts.
- Any retained product should be removed immediately from the oropharynx.
- Oral dilution therapy with water or milk may reduce mucous membrane irritation associated with a product and help to calm a child.
- Gastric lavage, potentially via a nasogastric tube if a liquid agent is ingested, should be undertaken if the patient presents early after having ingested a large amount of a household product
- Insertion of a lavage or nasogastric tube is contraindicated in alkaline corrosive ingestion.

- Activated charcoal has limited or no value since the small molecular weight of substances such as hypochlorite and ammonia precludes their adsorption to activated charcoal.

- More important, the relative nontoxicity of most household cleaners makes activated charcoal therapy unnecessary.

- Activated charcoal is contraindicated if gastrointestinal damage due to the corrosive properties of the product is suspected because it may obscure endoscopic evaluation of lesions and potentially could trigger vomiting.

- Syrup of ipecac, cathartics, and whole bowel irrigation have no role in the treatment of patients who ingest household cleaners.

Dermal and Ocular Exposures

- For dermal exposure, remove contaminated clothing and gently cleanse the affected areas with large volumes of tepid tap water.
- Do not attempt to neutralize the product with a corresponding acid or base.
- Caregivers should protect themselves from contamination by corrosive products.
- For ocular exposure, irrigate the eye at the scene of exposure using a gentle stream of tepid tapwater.
- In the emergency department irrigate with normal saline and perform an ophthalmologic examination.
- Most household cleaning product exposures produce only minimal ocular irritation.

- **Bleach and Ammonia**
- Exposures to household bleach and ammonia are best managed with oral dilution and reassurance.

- Emesis, gastric lavage, activated charcoal, and cathartics have no value.

- **Chlorine**
- Observe for dyspnea, hypoxia, stridor, bronchospasm, and noncardiogenic pulmonary edema.

- Humidified oxygen should be supplied if evidence of lung involvement exists.

- Bronchospasm should be treated with β_2-adrenergic receptor agonists such as albuterol.

- If upper airway edema is suspected, then intubation should be considered to maintain a patent airway.

Detergents

- The ingestion of a detergent is often associated with the development of emesis that is usually self-limited.
- Oral fluids may be indicated if several episodes of emesis have occurred.
- The alkaline builders in some detergents (especially automatic dishwashing detergents) may produce profound ocular irritation.
- Corneal irritation due to the physical and chemical properties of the detergent often necessitates the use of ocular irrigation and a thorough ophthalmologic examination.

Glass Cleaners

- Many glass cleaner exposures are from the direct spraying of the product into the eyes.
- Ocular irrigation, often conducted at the site of the exposure, may be adequate therapy.
- The ingestion of suicidal or voluminous amounts of products containing ethylene glycol monobutyl ether should be treated with gastric emptying via nasogastric tube followed by activated charcoal.