



Holiday Poisonings

Laila A. Salts, MD; Francis L. Counselman, MD

The holiday season is a time of celebration, but it is accompanied by an increased risk of poisoning in the home. This review covers the evaluation and management of toxicities and injuries caused by holiday-related plants and decorations.

The holiday season, a time of warmth, joy, and good cheer, is upon us. Yet with this most wonderful time of the year comes the possibility of poisoning and hazards in the home. As emergency physicians (EPs), we must ask ourselves: Which holiday items are potentially toxic to our patients? How do we evaluate and manage poisonings that result from exposure to these items? In this article, we review several plants and decorations that are unique to the holiday season. We discuss recommendations for evaluation and management of holiday poisonings that will avoid inappropriate work-ups and interventions while increasing recognition of truly dangerous ingestions, thus help keeping the season safe and merry.

Plants

Plant exposures are the fourth most common cause for calls to poison centers.¹ In 2012, US Poison Control Centers reported more than 30,000 toxic plant exposures in children younger than age 5 years.² Not

surprisingly, toxic plant ingestions occur most commonly in early childhood. The highest rate of mortality, however, takes place during the teenaged years, when suicide attempts are common.² The most common plant ingestions reported in the United States include peace lily, holly, philodendron, and poinsettia.³ These and the other frequently ingested potentially poisonous plants produce very little, if any, toxic effects. Approximately 95% of unintentional potentially toxic plant ingestions reported in the United States are managed safely at home.³

Poinsettia

The poinsettia is a large, prominent plant that was introduced to the United States in 1825 by Joel Poinsett, the US ambassador to Mexico. The poinsettia is one of the most commonly researched plants, and studies show the plant is not actually toxic.^{4,5} The myth of poinsettia toxicity is a widely held, yet false, belief. The legend involves a young child of an army officer stationed in Hawaii in 1919 who reportedly died

Dr Salts is an emergency medicine resident, Eastern Virginia Medical School, Norfolk. **Dr Counselman** is the distinguished professor and chairman of the department of emergency medicine, Eastern Virginia Medical School and a physician at Emergency Physicians of Tidewater, Norfolk. He is also the associate editor in chief of **EMERGENCY MEDICINE**.

Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

DOI: 10.12788/emed.2016.0071



Holly

© golak/Stock

after eating poinsettia leaves.⁴ However, the reality is that the poinsettia plant was not actually involved in the child's death. In fact, the wild plant involved in this case probably had little resemblance to the popular plant cultivated domestically in North America today.⁶

A majority of poinsettia exposures will be asymptomatic, or involve simple nausea and vomiting. Krenzelok et al⁵ reviewed 22,793 cases of poinsettia exposures from 1985 to 1992. Almost all of these exposures (98.9%) were accidental poisonings.⁵ Not surprisingly, 93.3% of poinsettia exposures involved children; most importantly, 96.1% of these patients did not require treatment at a health care facility, and there were no fatalities.⁵ Another study could not identify an LD50 (lethal dose, 50%—ie, the amount of an ingested substance that kills 50% of the test sample) in rats.⁴

The majority of patients presenting to the ED with symptoms from poinsettia exposure will have gastrointestinal (GI) upset. Most patients require only symptomatic care. Those who do present to the ED do not require gastric emptying.

Interestingly, there is a crossreactivity of poinsettia sap in latex-allergic vulnerable patients.⁶ Poinsettia is part of the same plant family as natural rubber latex, and patients can present with symptoms of contact dermatitis, especially if they have a latex allergy.⁴ Washing the area thoroughly with soap and water and avoiding future contact is all that is required for most patients with contact dermatitis.

Holly

Holly exposure accounted for the third highest rate of genus-specific human plant exposure calls to poison centers in 2010.⁴ In the United States, there are two common forms of holly: English holly and American holly. The berries of both varieties contain saponin, a toxin that can cause erythrocyte hemolysis and changes in the permeability of small intestinal mucosal cells.⁴ Most holly berry ingestions cause minor or no symptoms. The prickly leaves of the holly plant are nontoxic but consumption may result in minor injury. When symptoms do occur, they can include nausea, vomiting, abdominal cramping, and possible dermatitis.⁵ Mydriasis, hyperthermia, and drowsiness are rare but possible symptoms.⁴

For symptoms to develop, children need to have eaten only five berries, while adults reportedly must consume at least 20 to 30 berries.⁴ A study by Wax et al⁷ done at the University of Rochester reviewed 103 cases of toxic berry ingestion in children aged 9 months to 5 years, with children who swallowed six or fewer berries of holly, yew, or nightshade. Investigators compared home observation alone versus ipecac administration with home observation. Every patient treated with ipecac had emesis at home with increased sedation and diarrhea, while there was no emesis in the group with home observation alone.⁷ These results suggest the symptoms were due to the ipecac rather than plant toxicity.⁷ Thus, ipecac is not recommended, and patients should be treated symptomatically.

Bittersweet and Jerusalem Cherry

Bittersweet, also known as the woody nightshade, and Jerusalem cherry, or Christmas orange, are the most dangerous of the holiday plants. While there is little evidence to support serious toxicity to adults, ingestion may be dangerous to children. Bittersweet has purple and yellow flowers, spreading petals, and red, ovoid berries.⁴ Both plants are part of the genus *Solanum*. In both plants, the immature fruit is more poisonous than ripened fruit due to the glycoalkaloid solanine via hypothetical alteration of mitochondrial potassium and calcium transport.⁴ Case reports document the rare anticholinergic effects of these plants, likely due to dulcamarine.⁴

The largest case series included 319 ingestions of bittersweet or Jerusalem cherry.⁴ Of these, 295 patients were under age 10 years, and only nine experienced solanine-related symptoms; none required hospitalization.⁴ The symptoms of ingestion were primarily nausea and vomiting and abdominal cramping, possibly due to anticholinergic effects. Symptoms typically occur several hours after ingestion and may last for days.

Historically, induced emesis was recommended for ingestion in children, but this is no longer recommended. Prolonged observation may be necessary for children in the setting of high likelihood of ingestion. Management includes rehydration with intravenous (IV) fluids, antiemetics, and physostigmine if clinically warranted.⁴

Mistletoe

Mistletoe, a perennial with white or translucent berries, has traditionally been associated with kissing, fertility, and vitality. The American mistletoe is known as *Phoradendron serotinum* and the European mistletoe as *Viscum album*. Both the American and European mistletoe contain the toxalbumins phoratoxin and viscotoxin, which are associated with inhibiting cellular synthesis, thereby affecting cells with rapid turnover, including the GI mucosa.⁴



Mistletoe

After several hours, clinical effects are primarily GI upset with potential sloughing of portions of the intestinal tract.⁴ Bradycardia, delirium, and hepatic, central nervous system, kidney, and adrenal gland toxicities can also occur.⁸ The American species has a lower toxicity compared to the European species. Cases involving death likely related to *P serotinum* usually occur due to excessive, concentrated herbal use, such as brewing mistletoe in tea.⁹ Placing the plant in hot water may result



Bittersweet



© Tarzhanova/Stock

Tinsel

in larger amounts of ingested toxin. The only two reported deaths from ingestion of mistletoe were in patients who consumed brewed teas.⁴

A case review of 14 patients with American mistletoe leaf or berry ingestions failed to find any toxic symptoms.⁴ Krenzelok et al¹⁰ compiled the largest case review of 1,754 exposures from 1985 to 1992. In this review, patient outcomes were good. There were no fatalities, and 99% of patients experienced no morbidity. Outcomes were not influenced by GI decontamination.¹⁰

Another study by Spiller et al¹¹ described 92 American mistletoe exposures involving ingestions of up to 20 berries and five leaves. In cases where five or more berries were consumed, none of the patients had symptoms.¹¹ Three of the 11 patients (27%) who swallowed one to five leaves developed GI upset. One child had a seizure, likely not related to the mistletoe. The study concluded that severe toxic symptoms are uncommon.¹¹

Management in the ED should involve supportive care for dehydration and vomiting, typically IV rehydration with normal saline or Ringer's lactate and IV antiemetics. According to multiple case reviews, GI decontamination is not believed to alter patient outcome and is not recommended.⁴ An observation period of 6 hours is reasonable.^{4,10,11}

Christmas Cactus

Christmas cactus is an old-time favorite. It is made of arching, drooping branches and spineless joints. Christmas cactus is essentially nontoxic, and patients and family can be reassured of its safety.

Holiday Decorations

Artificial Snow

Fake snow sprays, powders, and granules are popular decorative additions used in holiday games and celebrations. The "snow" typically consists of a polymer of sodium polyacrylate, both of which can cause injury to the eyes. Repeatedly inhaling the aerosol spray can cause breathing problems, especially in patients who have asthma or other underlying bronchospastic disease.

Devastating outcomes may occur from ocular alkaline injury. When mixed with water, the fake snow absorbs the water and expands as a gel material that may stick to the ocular surface, resulting in a change in pH and osmolality.¹² A case report by Al-Amry and Al-Ghadeer¹² recently described a 7-year-old boy with corneal epitheliopathy due to a chemical burn injury following ocular contact with fake snow. The case was later managed with multiple debridements over 3 days, topical antibiotics, and bandage contact lenses. The child had complete resolution at 1 week follow-up.¹²

Some fake snow-product sprays contain acetone or methylene chloride, which is harmful when inhaled and can cause nausea, lightheadedness, and headache.¹³ Methylene chloride can be metabolized to carbon monoxide, but the quantity



Snow globe

required for such an exposure is unknown and has not been reported in this context. Emergency physicians should consider ordering carboxyhemoglobin levels in symptomatic patients.

Tinsel

Tinsel, which gets its name from the Old French word “estincele,” translated as sparkle, used to be made of actual silver, and was affordable only for wealthy individuals. However, in the early 1900s, manufacturers began to make tinsel from metals such as aluminum and copper. These materials did not tarnish and could be reused annually. However, during World War I, copper became difficult to buy, while aluminum proved to be flammable and dangerous. Thus, manufacturers began to produce tinsel from lead. Tinsel was made with lead until the 1970s, when the US Food and Drug Administration realized the toxic risks of lead exposure, especially in young children. Today, tinsel is made of plastic; though a poor imitation of the previous tinsel, it is relatively harmless.¹⁴

Angel Hair

Angel hair is finely spun glass that can be irritating to the skin, eyes, and throat, especially if swallowed.¹³ The greatest danger is

airway obstruction if a patient attempts to eat the angel hair and it becomes lodged in the oropharynx. For contact irritation, thoroughly washing and irrigating affected areas are recommended.

Snow Globes

Snow globes are popular holiday decorations that are available in a range of sizes. While the majority of globes made in the United States are filled with water, those manufactured overseas many contain a small amount of ethylene glycol (EG) (ie, antifreeze) to prevent freezing and breakage during shipping. Fortunately, the amount of EG is not usually sufficient to cause symptoms if ingested. For globes made in the United States, the water can be contaminated with bacteria, and drinking it can cause GI upset. The snow in these globes is typically made of inert material and does not cause toxicity. If a child does exhibit symptoms after ingesting any portion of a snow globe, parents are advised to call their local poison center.

Angel Hair



Ethanol

While alcohol is not unique to the holiday season, its availability and use are more pronounced during this time of year, and the incidence of alcohol poisoning increases during the holiday season. Some traditional holiday drinks containing alcohol, such as egg nog, can entice young children. Children may often imitate adults and drink from partially filled leftover glasses. Therefore, families with young children must ensure that all alcoholic beverages are placed out of children's reach.

A common presentation of alcohol poisoning is seen in the child who is brought to the ED by parents concerned because their child is acting strangely. On examination, the child may appear dazed and have tachycardia, tachypnea, and hypotension, depending on the amount of alcohol ingested. Hypoglycemia in an alcohol-intoxicated pediatric patient is a concern, but it

appears the effects of alcohol on glucose regulation in infants is unpredictable.¹⁵

Intravenous access should be obtained in any patient presenting with altered mental status, and rapid blood glucose level determined. Blood samples should be sent to assess ethanol concentration. Other laboratory and imaging studies should be obtained as clinically indicated, including electrolytes, serum osmolality, acetaminophen level, urine drug screen, X-ray, and computed tomography scan of the head. Treatment of respiratory depression, hypoglycemia, hypovolemia, and hypothermia are the key interventions to ensure good outcomes.¹⁶ Supportive care is the mainstay of therapy for pediatric patients, who rarely require thiamine supplementation.¹⁶ Medical evaluation is recommended for all symptomatic children; hourly observation for 6 hours is recommended for asymptomatic children.¹⁷

Alcohol is also associated with cardiac arrhythmias. Alcohol-induced atrial arrhythmias, most commonly atrial fibrillation (AF), are referred to as "holiday heart syndrome." This should be considered early in the differential diagnosis of new-onset AF in young adults. Consuming massive quantities of alcohol or binge drinking can also result in metabolic and electrolyte alterations. Treatment includes rehydration with IV fluids, electrolyte replacement, and IV diltiazem or cardioversion for AF with rapid ventricular response.¹⁸

Conclusion

During the holiday season, it is easy to overlook the fact that some of the most unsuspecting items in the home can pose real hazards (**Table**). In addition, many holiday plants are used as table decorations, which can confuse small children, who may assume the colorful berries must be edible if they are on the dining room table.

It is vital that patients, parents, and physicians know what to do when someone ingests a potential toxin. Parents often try to induce vomiting, but ipecac and other forms of gastric emptying are no longer



© Lisa F. Young/Shutterstock

Egg nog

Table. Poisoning From Holiday Plants/Decorations: Presentation and Management^{a,2,5,6}

Plant/Decoration	Toxin	Clinical Presentation	Management
Poinsettia	None	Nausea, vomiting; contact dermatitis with sap can occur in latex-allergic patients	Symptomatic care: fluids as needed, electrolytes. Wash dermal exposures with soap and water
Holly	Saponin	Nausea, vomiting, abdominal cramping, electrolyte loss, dermatitis. Rare: mydriasis, hyperthermia, drowsiness	Symptomatic care: fluids as needed, antiemetics, basic laboratory evaluation. ECG for patients with abnormal vital signs or CNS depression
Bittersweet and Jerusalem cherry	Solanine	Nausea, vomiting, abdominal cramping, electrolyte loss, anticholinergic effects	Symptomatic care: fluids as needed, antiemetics, basic laboratory evaluation. ECG for patients with abnormal vital signs or CNS depression. Physostigmine if central anticholinergic toxicity
Mistletoe	Phoratoxin Viscotoxin	Nausea, vomiting. Uncommon: bradycardia; delirium; and liver, central nervous system, renal, and/or adrenal gland toxicity	Symptomatic care: fluids as needed, antiemetics, basic laboratory evaluation, and LFTs. ECG for patients with abnormal vital signs or CNS depression
Christmas cactus	None	Nontoxic except for mechanical injury	Supportive care for wounds
Artificial snow	Alkaline polymer of sodium polyacrylate	Bronchospasm, ocular alkaline injury	Symptomatic care for bronchospasm. Copious irrigation of eyes. Ophthalmology consult for persistent symptoms or visual impairment
Tinsel	Lead	Lead toxicity in tinsel manufactured before 1970. Current tinsel is made of plastic	Lead poisoning management with serum lead levels. Current tinsel is harmless
Angel hair	None	Airway obstruction, contact dermatitis	Obstruction removal. Wash and irrigate affected skin areas
Snow globes	Ethylene glycol	Normally, amount of ethylene glycol in snow globes is not sufficient to cause symptoms if ingested. Ethylene glycol symptoms include altered mental status, dyspnea, and metabolic acidosis	Symptomatic care. If symptoms of ethylene glycol toxicity: fluids as needed, antiemetics, fingerstick glucose, basic laboratory evaluation, serum calcium level, serum osmolality, arterial blood gas, ECG, urinalysis
Alcohol	Ethanol	Altered mental status, unresponsiveness, seizures, nausea, vomiting, tachycardia, respiratory depression, hypotension, tachypnea	Fingerstick glucose, ethanol level. Symptomatic care: fluids as needed, antiemetics, urine drug screen, electrolytes, serum osmolality

^aContact the American Association of Poison Control Centers (1-800-222-1222). Regional poison control centers are available for consultation on patients who are critically ill, require admission, or have clinical pictures that are unclear.

Abbreviations: CNS, central nervous system; ECG, electrocardiogram; LFT, liver function test.

recommended.⁶ Instead, the recommended action is to separate the patient from the plant, remove plant material that may cause a sensitivity reaction, and consult a poison control center, which can save unnecessary interventions—including an ED visit.⁶

Fortunately, most holiday toxicities are relatively nonthreatening. Holiday-related toxic ingestions primarily occur in children, and most are asymptomatic, innocuous, and treated with symptomatic care as necessary. The most poisonous holiday-related toxins are bitterweet and Jerusalem

cherry. Work-ups for holiday-plant ingestions are usually limited to severe gastroenteritis, which may require IV fluids and evaluation of electrolytes.

Holiday decorations, such as artificial snow and angel hair, present hazards that should be treated on a case-by-case basis. Finally, alcohol intoxication should be considered in the differential diagnosis for pediatric patients presenting with altered mental status, or the otherwise healthy binge drinker who presents with palpitations and new-onset AF.

References

1. Krenzelok EP, Jacobsen TD, Aronis J. Those pesky berries...are they a source of concern? *Vet Hum Toxicol*. 1998;40(2):101-103.
2. Martínez Monseny A, Martínez Sánchez L, Margarit Soler A, Trenchs Sainz de la Maza V, Luaces Cubells C. [Poisonous plants: An ongoing problem]. *An Pediatr (Barc)*. 2015;82(5):347-353. doi:10.1016/j.anpedi.2014.08.008.
3. Krenzelok EP, Mrvos R. Friends and foes in the plant world: a profile of plant ingestions and fatalities. *Clin Toxicol (Phila)*. 2011;49(3):142-149. doi:10.3109/15563650.2011.568945.
4. Evens ZN, Stellpflug SJ. Holiday plants with toxic misconceptions. *West J Emerg Med*. 2012;13(6):538-542. doi:10.5811/westjem.2012.8.12572.
5. Krenzelok E, Jacobsen TD, Aronis JM. Poinsettia exposures have good outcomes...just as we thought. *Am J Emerg Med*. 1996;14(7):671-674. doi:10.1016/S0735-6757(96)90086-90088.
6. Courtemanche J, Peterson, RG. Beware the mistletoe. *CMAJ*. 2006;175(12):1523-1524. doi:10.1503/cmaj.061432.
7. Wax PM, Coughlin DJ, Lawrence RA. Should home ipecac-induced emesis be routinely recommended in the management of toxic berry ingestions? *Vet Hum Toxicol*. 1999;41(6):394-397.
8. Palmer ME, Betz JM. Plants. In: Nelson LS, Lewin NA, Howland MA, Hoffman RS, Goldfrank LR, Flomenbaum NE, eds. *Goldfrank's Toxicologic Emergencies*. 9th ed. New York, NY: McGraw Hill; 2011:1537-1560.
9. Bruneton J. *Toxic plants dangerous to humans and animals*. Paris, France: Lavoisier Publishing; 1999.
10. Krenzelok EP, Jacobsen TD, Aronis J. American mistletoe exposures. *Am J Emerg Med*. 1997;15(5):516-520.
11. Spiller HA, Williams DB, Gorman SE, Sanftleban J. Retrospective study of mistletoe ingestion. *J Toxicol Clin Toxicol*. 1996;34(4):405-408.
12. Al-Amry MA, Al-Ghadeer HA. Corneal epitheliopathy after trauma by fake snow powder in a 7-year-old child. *Middle East Afr J Ophthalmol*. 2016;23(3):274-276. doi:10.4103/0974-9233.186157.
13. California Poison Control Center. Winter holiday safety & poison prevention tips. <http://www.calpoison.org/public/winter-holidays.html>. Accessed October 16, 2016.
14. Romm C. Don't lick the tinsel. *The Atlantic*. December 21, 2015. <http://www.theatlantic.com/health/archive/2015/12/dont-lick-the-tinsel/421506/>. Accessed October 16, 2016.
15. Minera G, Robinson E. Accidental acute alcohol intoxication in infants: review and case report. *J Emerg Med*. 2014;47(5):524-526.
16. Baum CR. Ethanol intoxication in children: clinical features, evaluation, and management. UpToDate. <http://www.uptodate.com/contents/ethanol-intoxication-in-children-clinical-features-evaluation-and-management>. Accessed October 16, 2016.
17. Vogel C, Caraccio T, Mofenson H, Hart S. Alcohol intoxication in young children. *J Toxicol Clin Toxicol*. 1995;33(1):25-33.
18. Carey MG, Al-Zaiti SS, Kozik TM, Pelter M. Holiday heart syndrome. *Am J Crit Care*. 2014;23(2):171-172.