



MedicCast Extra



Tip of the Week Transcript:

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HOUSEHOLD CLEANER POISONINGS - Interview with Lisa Booze of Maryland Poison Control

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We're going to be talking with our friend over at Maryland Poison Control, Lisa Booze, I had an opportunity to talk with her again about another common problem this time of the year. People are spring cleaning and getting their houses ready for the summertime and vacation and barbecues and get-togethers and part of that is a problem associated with household cleaners and poisonings associated thereof. So I had an opportunity to pick Lisa's brain on this topic.

Jamie Davis: I'm always waiting, it's spring time here and I'm wondering what you have for us?

Lisa Booze: Well, I thought with the start of spring, everybody likes to start spring cleaning, and so one of the items that people will use are cleaners –

household cleaners – and around this time occasionally we'll see an increase or spike in calls to the poison center with kids and adults who had been exposed to these cleaners. There are literally hundreds of different types of cleaners that we use and many years ago, people would have maybe one cleaner, maybe two cleaners, in their house. Now there's a cleaner for everything and if you look under someone's sink there might be 20 different cleaners under there for children to get in to. In 2006, there were more than 214,000 poisonings with household cleaners that were reported in the different Poison Control Centers in the US. More than half of those involved children less than six.

There are many reasons why people can be poisoned by cleaners. Children are sometimes drawn to the brightly-colored containers and the liquids. They might smell good so they draw the child to the container because of that. They might have a fruity odor or a floral type of odor. By law, all products that have concentrations of caustics more than 2% must be in child-resistant containers, but poisonings do occur often when the child is around the parent or the caretaker while the product is in use. So the lid is actually not on the container. The child would pick it up and drink out of it. Sometimes the top is on but it hasn't been on properly, it hasn't been screwed on completely so the child-resistant mechanism is just not there. Most unfortunate and preventable cause of poisoning is when someone drinks from a beverage container, like a soda bottle, only to realize afterwards that their mouth is starting to burn and so they know that it contains something other than the beverage. We see a lot of people who bring in industrial cleaner which are much more caustic and much more dangerous than household cleaners, but they'll bring them home from work and they'll put them in soda bottles or water bottles or milk containers and to a child or even an unsuspecting adult, they may pick up this bottle and drink

out of it only to find out that it's a pretty strong cleaner afterwards. Then still other adults will drink cleaners intentionally as in suicide attempts.

Alkaline Corrosives and Acids

There are a lot of different types of cleaners but the ones that create the most problems are caustic and caustics can be either acids or they can be alkaline corrosives. Acids have low pH and so if you test the product with pH paper, the pH would be on the order of 1-2, on the low-end of the scale. The chemicals that are acidic or very acidic are chemicals like sulfuric acid, hydrochloric acid, phosphoric acid, and there are many others, and they're found in drain cleaners, car batteries, toilet bowl cleaners, metal cleaners and again these industrial-type products. Acids produce pretty severe burns on the skin and the eyes if they are splashed or they're spilled. Alkaline corrosives can do that as well.

Now acids are a little bit different than alkaline corrosives. Alkaline corrosives are found in drain cleaners, oven cleaners, denture cleaners, bathroom cleaners, they're also found in hair relaxers. They have a pH up on the upper scale, like up around 12-14 and they include the chemical sodium hydroxide – that's also known as lye – potassium hydroxide, and sodium carbonate. These alkaline corrosives or these alkaline cleaners when they are ingested they produce what's called a "liquefaction necrosis" and basically what that means is that it causes the proteins, and the collagens, and substances that are on the mucosa that it touches, causes them to dissolve and it allows pretty deep penetration burns into the mucosal tissue. It primarily affects the esophagus and these burns on the esophagus can be quite severe. Acids on the other hand produce burns that are called "coagulation necrosis." So that causes destruction of the tissue on the surface and it sort of prevents severe burns from penetrating. Acids also don't affect the esophagus as much as they do to the stomach. So it's a little bit different as far as the area that they burn. Of course, in either case, you can see burns throughout the GI tract but mostly acids affect the stomach where the alkaline corrosives affect the esophagus.

Bleach is another product that we get called about. Bleach contains hypochlorite usually sodium hypochlorite and that's an alkaline caustic but household bleach is pretty dilute. So it really doesn't cause caustic injury unless a very, very large amount is ingested such as what you might see in a suicide attempt; but unintentional ingestions of household bleach by children or adult usually only produce some nausea and vomiting, maybe a little oral irritation and that's usually about it. With large amounts or with industrial bleaches, you can see some burns at the esophagus. So they act very much like all the other alkaline corrosives.

Hydrofluoric Acid

One of the acids that I wanted to mention that's a little bit different is hydrofluoric acid that's found in rust removers, and metal cleaners, and brick cleaners. The hydrofluoric acid is a little different than other acids because it penetrates pretty deeply into the tissues and it causes deep burns so that the actual surface of the skin might look completely normal in relation to the amount of pain and damage that's being done underneath the skin. Sometimes it's delayed, it takes time for that to happen so they might not have symptoms right away, and maybe an hour or two or a few hours later, they might start to develop some pretty severe pain, might be a little bit

near the skin but usually that's about it. So that's a little bit different. The other problem with hydrofluoric acid is that with really large amount, and large exposures, the fluoride that's in the hydrofluoric acid will bind the calcium and magnesium in the body and that will cause a drop in both of these electrolytes; and the result of that is tetany, you can see QT-prolongation, other types of arrhythmias and cardiac arrest. You do see, more than ways, systemic effects with the hydrofluoric acid.

Jamie Davis: This is important to remind people that it's really good to get a good history because in this situation, if they're going to have symptom onset hours later, this is the guy that went out to scrub the mold off of the brick on the shadowy side of his house and didn't read the instructions completely and was wearing shorts and a t-shirt instead of wearing his rubber gloves and a long sleeve and a long pants and they end up getting contact with this substance that ends up causing them some injury, I guess.

Lisa Booze: That's exactly right and the real common complaint that we hear about are people who call the poison center and it might be a couple of hours later after they've used this product and they start complaining of pain in their fingertips. It's because they've been using maybe a cloth or a sponge or a brush or something that got it on their fingers and again you looked at their fingertips or their fingers, they look perfectly fine but the pain can be quite severe. So that's a sort of a tip-off. With most caustics, you're going to see symptoms right away, whether it's alkaline corrosives or acids but hydrofluoric acid is a little different so it will be delayed. So it's important to find out what type of product this is. If a caustic is ingested, you're going back to all the other acids and the alkaline corrosives. If they have burns in their esophagus or their stomachs they will have symptoms. There will be pain, they might have difficulty in swallowing, there might be pain in their stomach or in their throat. Adults and especially children will have a lot of drooling because it just hurts so bad for them to swallow, or there so much swelling in their esophagus that it's difficult for them to swallow. There may or may not be burns in the mouth. If you look inside the mouth, the mouth may look completely fine and the person might still have pretty severe burns in the esophagus and the stomach. So we can't rely on that in assessing the patient. Even if their mouth and their lips look fine, if they have some pain or difficulty swallowing, they can have some pretty severe burns further down. If they have some swelling in the esophagus then they might have some respiratory difficulties and so it's important to assess their respiratory status with some of these severe burns. Respiratory tract damage can also occur because these caustics – these cleaners have soaps in them that can cause vomiting. So it might re-expose the esophagus to the caustic and then they can also aspirate the stomach contents or the acid or the corrosive and that can lead to respiratory tract damage.

There are complications that occur days or weeks later, and that would include perforations, gastric hemorrhaging, esophageal obstruction, upper airway obstruction, so a lot of things that happen later on. So this is not the poisoning that ends within a few hours like a lot of your typical poisonings and overdoses. They might recover in a few hours and everything's okay. This is one that can actually last weeks, or months, or even years. The damage is so severe that they might even require surgery many years later.

Treatments

Besides finding the specific product, treatment on the scene consists primarily of the irrigation of the affected body parts, and we recommend doing that with either water, or saline, or lactated Ringer's for a minimum of 15 minutes and actually it's probably better to do that for 30 minutes especially with some of the more severe caustics. It's a good idea to irrigate a lot longer than 15 minutes. As far as having somebody drink something to try to dilute the substance, it really doesn't do much unless you do it within the first few minutes. By the time an EMS provider sees the patient or by the time the physician or the nurse in the hospital sees the patient, the damage is usually already done. However, we do recommend anyway that the patients who are awake and alert be given small amounts of either milk or water. What that means, it's usually about 2-4 ounces or less in a small child and no more than 8 ounces in an adult. If you give more liquid than that, that can cause some vomiting and that's going to re-expose the esophagus and the mouth to the caustic.

Children shouldn't be forced to swallow the liquids. If children tolerate liquids and they have no symptoms at all, nothing whatsoever, then they're very unlikely to have any injury at all. We don't recommend charcoal, that does not adsorb caustics or lessen the injuries so we don't want to give activated charcoal. Years ago, [unintelligible] so we might recommend baking soda if it was an acid that was ingested or we might recommend giving lemon juice or vinegar if it was an alkaline substance like lye that was ingested and what we know now though is that when you do that, when you try to neutralize something, it generates gas and releases heat as well and so that can worsen the injury. So we never want to neutralize the substance either if it's been ingested or if it's on the skin or in the eye. Hydrofluoric acid burns are treated a little bit differently, we actually use a calcium gluconate gel topically and that helps to bind the fluoride ion and keep it from penetrating.

Mixing Cleaners

Another common call to Poison Centers, I just want to briefly mention, is the mixing of cleaners. People will often mix cleaners like bleach and ammonia together. They think, "Bleach is a good cleaner, ammonia is a good cleaner, then mix the two and that will produce the better cleaner," but what really happens is when they mix those two together, they're going to produce a gas and in the case of bleach-ammonia the gas is called "chloramine gas." When people call the poison center after mixing these cleaners together, they're coughing a lot, they have runny nose, their eyes are irritated, they may have a little bit of shortness of breath. In most cases, if they're normal, healthy patients, they do well just with fresh air and liquids just to soothe the throat. Usually the symptoms will go away maybe within 8 or 12 or maybe up to 24 hours later. Some people who have underlying respiratory problems, they may need some respiratory support in the short term. If an acid, such as one of these toilet bowl cleaners for example is mixed with bleach then that produces chlorine which produces the same symptoms but it is a little bit more toxic and can produce a little bit more serious pulmonary problems. So treatment of patients who's been exposed or breathing in fumes from these chemicals or these cleaners, is basically fresh air in support of care and again in most cases, they do well just staying at home. However, in some cases they will need some respiratory support.

We always recommend calling the poison center. Call the national number, which is 800-222-1222 and be sure to have the product there with you when you call the poison centers because we may ask you – not only the name of the product but maybe the ingredients. Sometimes we'll actually contact the manufacturer to find the pH of the products, so that we know how strong an acid it is or how strong an alkaline corrosive it is. So it's important to get the poison center involved pretty rapidly after one of these exposures.

Jamie Davis: Great. Lisa, as always, just great information, and I really appreciate you taking the time to share this with the listeners here on the show and we'll be back in touch with you next month for another segment.

Lisa Booze: Thanks. I'm looking forward to it.