



ROUTES OF POISON ABSORPTION

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Thank you Missah. Welcome to the second lesson called the routes of poison absorption. Broadly speaking, there are four ways for the poison to reach a person's body. They are ingestion, inhalation, injection, and absorption. Each of these routes is unique in their own ways, which means, the assessment and management would also vary greatly.

It also merits to note that the biological results can be different for the same dose, depending on the route through which it enters the body.

Good studying.

Poisoning by Ingestion | Introduction

- Enter the body by swallowing
- Possible substances
  - ✓ Over-the-counter pain medications
  - ✓ Prescription medicines
  - ✓ Cosmetics
  - ✓ Cleaning products
  - ✓ Plants
  - ✓ Alcohol
  - ✓ Illegal drugs and sedatives



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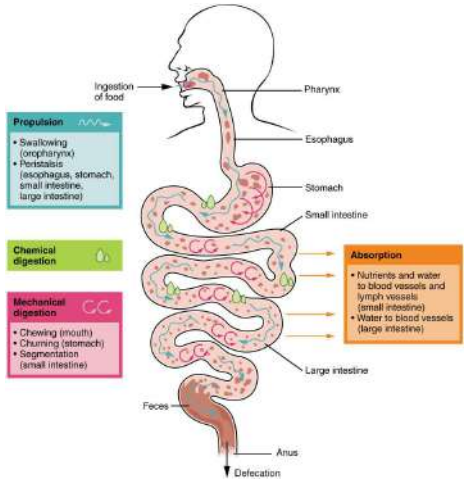
In the ingestion route, a poisonous or harmful substance enters the body as a result of swallowing. In other words, a person can intentionally or unintentionally swallow a harmful substance, that in turn, can have a profound negative impact on the individual.

Some substances that are likely to be ingested include, over-the-counter pain medications, prescription medicines, cosmetics, cleaning products, and plants. For the most part, a patient can recover from the effect of these substances, though it also depends on the age of the patient and the quantity of poison consumed.

According to an article in the Journal of Nursing, the chances for fatalities is high when a person has ingested analgesics, antipsychotics, antidepressants, cardiovascular medications, alcohol, illegal drugs, and sedative drugs.

Poisoning by Ingestion | Metabolism

- Moves to the stomach through esophagus
- Hair-like objects called villi in small intestine absorb them
- Insoluble and large objects are expelled through feces
- Acids and bases can corrode the digestive system



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So, what exactly happens when you ingest a poisonous substance? As with all foods, it gets swallowed and moves to the stomach through the esophagus. Some chemicals like alcohol can enter the bloodstream directly while other harmful substances enter the small intestine. Here, the tiny hair-like objects called villi present on the walls of the small intestine, absorb the chemical and send it to the bloodstream.

Substances that are not soluble, or if its molecules are too big for the villi to absorb, remain in the gut and are

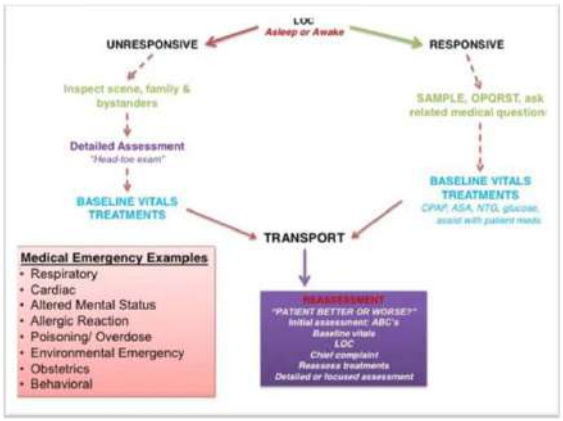
expelled through faeces.

Also, some substances like acids and bases, can corrode or burn the digestive system if consumed in large quantities.

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POISONING BY INGESTION | ASSESSMENT AND FINDINGS

- Stabilize the patient with ABC
- Look for burn signs in the tongue, mouth or esophagus
- Collect vomit
- Check patient's condition
- Talk to patient and family members
- Take cues from body odor



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The first step is to stabilize the patient if necessary, so focus on the ABCs, that stand for airways, breathing, and circulation.

Next, assess the patient in the mouth area and look for any burn signs in the tongue, mouth, or esophagus.

If a patient vomits at any time, collect the vomitus, and send it to the lab for analysis.

Also, check the patient's condition, pulse oximetry value, glucose levels, mental state, and pupil size, as all these can give clues about the toxicity of the substance and

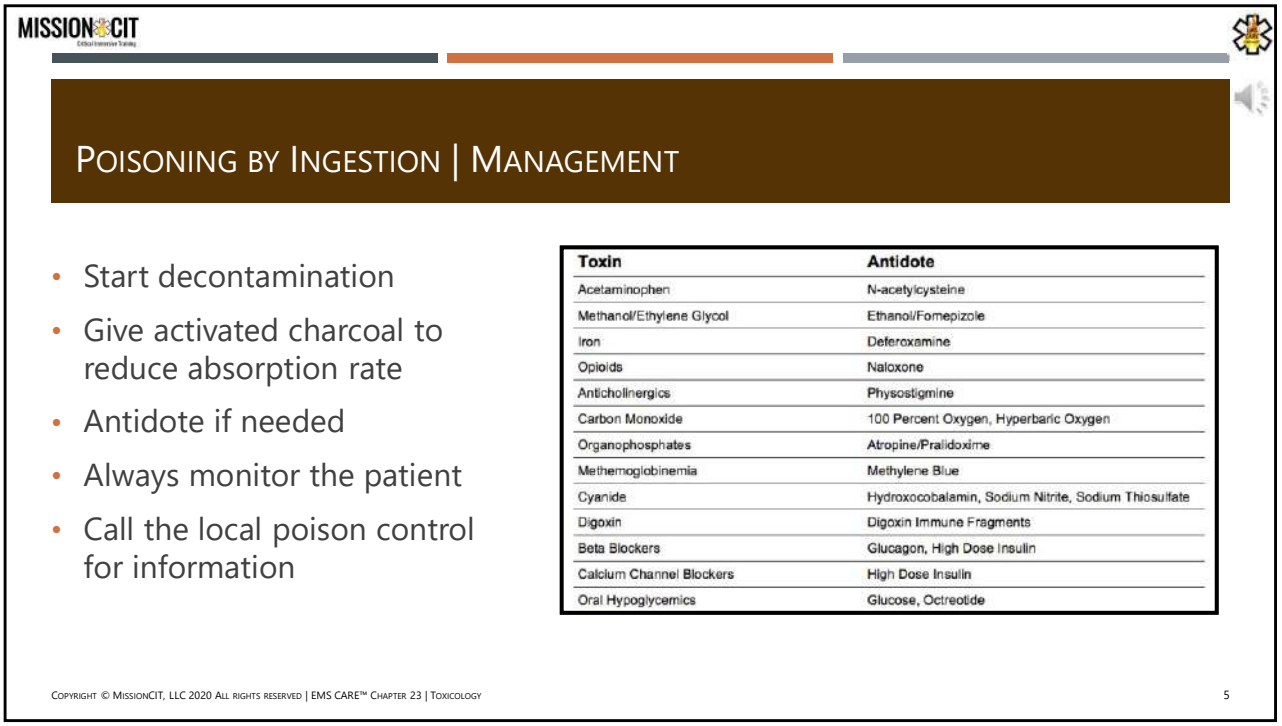
the patient’s reaction to the same.

If required, consider ordering blood and urine tests to get a better understanding.

In the meantime, talk to the patient if possible, to family members and friends, or even the police to gather sufficient information about the ingestion.

To assess if a patient is suffering from an ingested substance, find out the substance that was ingested and the time when it happened. This should give you a good idea of the severity of the toxicity. Odors from the breath or body can be a good indicator as different substances tend to give out different smells. For example, if there is an odor of rotten eggs, the patient has ingested hydrogen sulfide. Likewise, a bitter almond odor is caused by cyanide while a garlicky odor may indicate the presence of arsenic, thallium, or selenium.

Put all this information together to conclude what the patient has ingested, when it was ingested, and the patient’s reaction to this substance, so appropriate treatment can be provided.



Once the patient is stabilized and you have identified the poison that was ingested, start decontamination. The degree of decontamination will depend on the amount of ingestion.

Firstly, give activated charcoal to prevent further absorption. Finally, assist in the administration of an antidote if needed.

While doing all this, continue to assess the patient's vital signs, mental status, and the size of the pupil, to ensure that the patient is making progress.

If you’re unsure of something, call the local poison control center and look up the guidelines issued by the national poison control center.

Poisoning by Inhalation | Introduction

- Most common route of absorption
- Vapors, gases, mists, and small particles
- Some are expelled by exhalation
- Remaining are deposited in the respiratory tract
- Tissue degeneration, mixing with blood, impacting organs
- Ammonia, hydrogen chloride, hydrogen sulfide, chlorine, sulfur dioxide, nitric oxide, and hydrogen fluoride



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Inhalation is the most common way by which poisonous substances enter the body. Typically, poisonous substances in the form of vapors, gases, mists, or small particles enter the body through inhalation. Some particles are expelled through exhalation while the remaining get deposited in the respiratory tract. Next, these substances can come in contact with the tissue, leading to tissue degeneration. Sometimes, these substances can also mix into the bloodstream through the lung-blood interface.

The effects of inhaled substances range from mild

irritation to organ destruction, especially when these substances get mixed in the blood and are sent to the organs. Sometimes, acids that are inhaled can cause serious and irreparable damage to the nose, trachea, bronchi, and even lungs, depending on how much was inhaled.

The amount of toxicity present in the patient will also depend on the intensity of the inhaled substance, duration of exposure, and the quality of ventilation in the space where the exposure occurred. Some common chemical irritants that can cause acute injury are, ammonia, hydrogen chloride, hydrogen sulfide, chlorine, sulfur dioxide, nitric oxide, and hydrogen fluoride.

Poisoning by Inhalation | Assessment and Findings

- Examine eyes, nose, pharynx and skin
- Look for signs of burns, soot, dryness, wheezing, cough, and dysphagia,
- Hoarseness in voice and coughing
- Dizziness and headaches
- Unconscious due to prolonged exposure
- Do pulmonary function tests
- Check for obstructions



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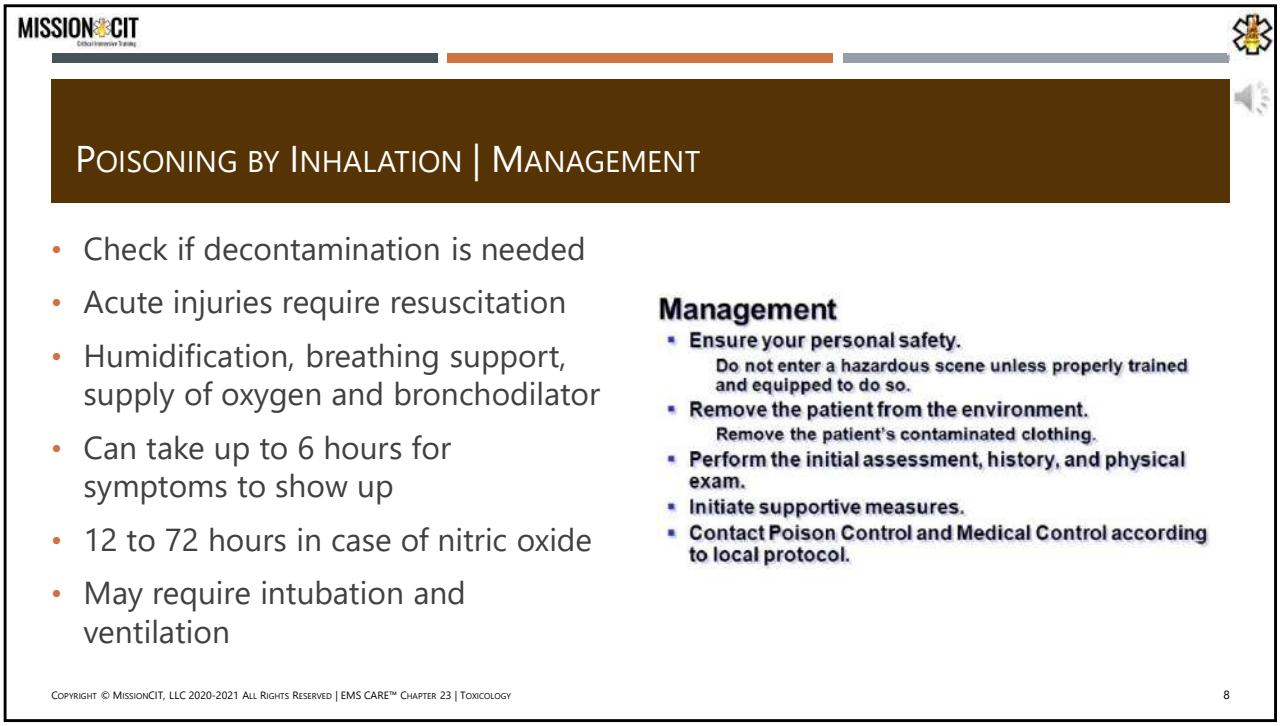
The assessment begins with the examination of the eyes, nose, pharynx, and skin. In particular, examine the upper airway for signs of burns, soot, dryness, wheezing, cough, and dysphagia, as these are signs that the patient has been exposed to some poisonous substance. Sometimes, edema in the nose, pharynx, and larynx is also a sign you should look for.

If the patient is unable to speak or has hoarseness and cough while speaking, it could indicate a severe laryngeal injury. In the case of systemic poisons such as cyanide or hydrogen sulfide, the patient will complain of

dizziness and headaches followed by chest pains. In some severe cases, the patient may be unconscious due to prolonged exposure.

In the meantime, do pulmonary function tests to check for obstructions and other damages due to inhalation.

Gather all the information to assess the impact of the poison.



Once you find the cause of poisoning, consider if decontamination is required. Most times, you don't need one if there is no irritation to the eyes or skin.

The treatment will depend on the severity of the poisoning. Acute lung injuries require resuscitation followed by extensive support treatment. Humidification, breathing support, the supply of oxygen, and inhaled bronchodilators are some of the other possible courses of treatment.

One aspect to keep in mind is that it takes up to six hours for the symptoms to show up after a person has inhaled

poisonous substances, so keep watch through the entire duration. In the cases of insoluble substances like nitric oxides, it can take anywhere from 12 to 72 hours, so the patient must be monitored throughout this time.

Finally, check if the patient needs intubation or ventilation, and provide the same if needed.

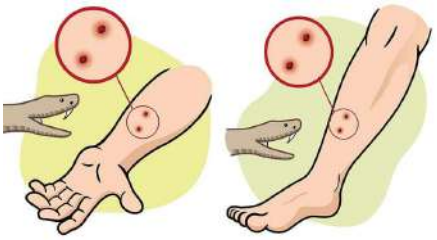
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POISONING BY INJECTION | INTRODUCTION

- Injection is when the skin is punctured with contaminated objects
- Directly enter bloodstream
- Animal bites – Viper snakes, scorpions, and some spider species
- Suicide by injecting poison







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Moving on, poisonous substances may enter the body when the skin is punctured with contaminated objects. These substances directly enter the bloodstream and can be deposited in the target organs.

This route of absorption is common when an animal bites a human and the venom is injected into the patient. Some common animal bites you should watch out for are viper snakes, some kinds of spiders, and scorpions.

Sometimes, patients may try to commit suicide by injecting poisonous substances like cyanides, so that

is something to watch out for as well.

Poisoning by Injection | Assessment and Findings

- Examine the local site of injection
- Look for marks of animal bite or injections
- Watch out for other symptoms like convulsions and dizziness
- Check the guidelines for treatment of animal bites



Insect Bite

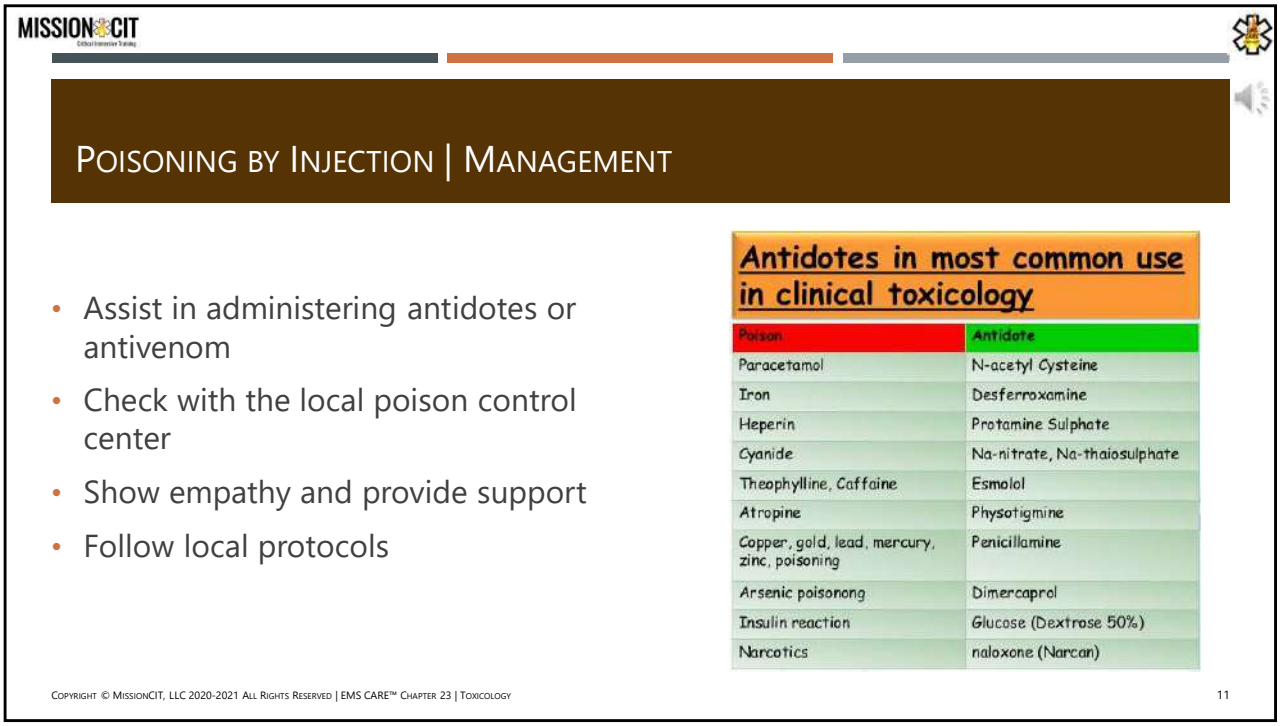


Abscess



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To assess if the poison has been injected into a patient, examine the local site of injection. Most times, you should see a visible mark of the animal bite or the injection, and sometimes you may even see a sterile abscess.
Watch out for other symptoms like reduced heartbeat, dizziness, convulsions, and other symptoms related to poisons.
Check out the guidelines issued by the national poison control center on antidotes and treatments for animal bites.



So, animal bites and intentional injection of drugs are the two possible ways a poison can mix with the bloodstream through the injection route.

If the poison was due to animal bites, assist in the administration of antidotes immediately. The poison control center can guide you on what anti-venom or antidote to administer for what bites, and they can also tell you what to do if you can't identify which animal was responsible for the bite.

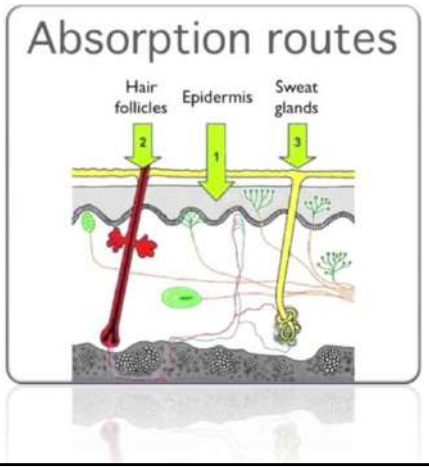
Also, if the injection was intentional, the patient may refuse medical treatment and may want to be left alone

to die. Show empathy and provide the best support you can. Be ready to call the police or protective custody if needed.

And finally, make sure you follow all the local protocols related to contact procedures.

Poisoning by Absorption | Introduction

- Contact with skin or eyes
- Directly mixes with the bloodstream
- Rate of absorption increases
  - ✓ During a workout
  - ✓ Cuts in the top layer of the skin
  - ✓ Prolonged exposure



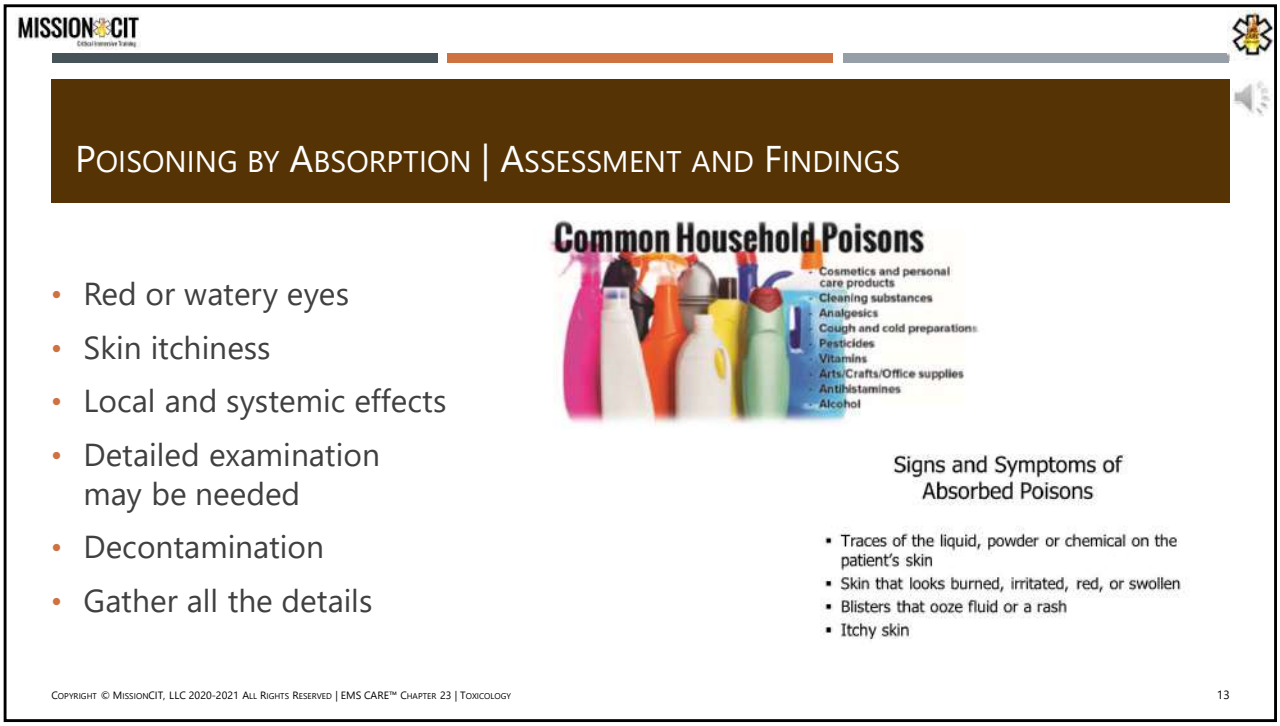
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Lastly, we will look at absorption. In this route, a poisonous substance can come in contact with the skin or eyes, and can enter the body through it. Like injection, the poison is absorbed directly in the bloodstream and can reach the organs rather quickly.

In general, absorption is exacerbated when a person has cuts on abrasions on the top-most layer of the skin. Also, the chances for absorption is high during an exercise routine as the blood flows rapidly through the body. Similarly, the increased skin temperature during a workout opens the sweat cells

and the water can quickly dissolve the toxins and send them to the bloodstream. High amounts of contact time to the poison increases the rate of absorption as well.



Identifying poison that has entered the body through absorption is relatively simple, provided you get to examine the patient within a short time after absorption. Usually, the effects of absorption tend to be obvious in the form of red or watery eyes, and itchiness on the skin. In fact, you'll see both local and systemic effects with this kind of poisoning.

In some cases though, you may not find the signs of poisoning on the skin or the eyes. And in such situations, a more detailed examination including blood work may be necessary to understand the kind of poison that has

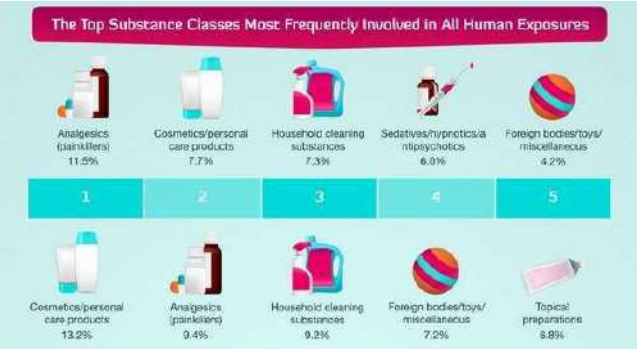
mixed with the blood stream.

In all likelihood, the patient may require decontamination before treatment.

As a part of the assessment, understand what the patient was exposed to, for how long, and the associated effects. All this information will come in handy to decide the right course of treatment.

Poisoning by Absorption | Management

- Transport Immediately
- Stabilize the patient
- Look for vital signs



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The management starts by determining whether the patient's life is in danger, and if so, transport immediately. Check the vital signs and stabilize the patient.

Also, look for vital signs of poisoning. Then, if your training permits, and the antidote is available, provide the treatment accordingly.

General Guidelines for Assessment and Management

- Check documentation and manuals
- Reach out to the nearest poison control center if needed
- Follow local protocols
- Size up the scene and look for vital clues
- Assess the patient
- Inform law enforcement if needed
- Wear protective gear



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So, we saw the different routes of absorption and the assessment and management for each.

Besides these treatments, here are some general guidelines to consider.

First off, stay on top of the documentation and manuals sent by the national poison control center. This information is updated frequently, so make sure you read through the latest communication.

Reach out to the nearest poison control center if you're unsure of something and need some additional

information to determine the right course of action.

While providing or assisting in providing treatment, ensure you follow the local protocols and procedures.

As soon as you enter a place, size it up, and look for any signs that can give you a clue on the type of poison. Specifically, look for bottles, containers, check the labels, and look around for other clues. Based on what you see, decide if the patient requires immediate transport. This could be necessary if the patient has lost consciousness or if the patient is a life-threatening situation.

Inform the law enforcement officers if necessary.

And finally, wear protective gear, so you are not impacted by the poison. This is particularly true if you have to handle hazardous substances or fumes. Call for help in such cases.

With this, we have come to the end of this lesson, and Missah will next talk about the drugs of abuse.