

Poisoning

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LEARNING OBJECTIVES

After mastering the contents of this lecture, the student should be able to:

- **1.** Define the terminologies.
- 2. Describe the causes of Poisoning
- 3. List the assessment and diagnostic findings for Poisoning
- 4. Describe the management of Poisoning

TERMINOLOGIES

Corrosive poisons

Carbon monoxide

Skin contamination

Food poisoning

Poisoning

A poison is any substance that, when ingested, inhaled, absorbed, applied to the skin, or produced within the body in relatively small amounts, injures the body by its chemical action. Poisoning from inhalation and ingestion of toxic materials, both intentional and unintentional, constitutes a major health hazard and an emergency situation.

Emergency treatment is initiated with the following goals:

- 1. To remove or inactivate the poison before it is absorbed
- 2. To provide supportive care in maintaining vital organ function
- 3. To administer a specific antidote to neutralize a specific poison
- 4. To implement treatment that hastens the elimination of the absorbed poison

9.1. Ingested (Swallowed) Poisons

Swallowed poisons may be corrosive. Corrosive poisons include alkaline and acid agents that can cause tissue destruction after coming in contact with mucous membranes.

Alkaline products include lye, drain cleaners, toilet bowl cleaners, bleach, nonphosphate detergents, oven cleaners, and button batteries (batteries used to power watches, calculators, or cameras).

Acid products include toilet bowl cleaners, pool cleaners, metal cleaners, rust removers, and battery acid.

Assessment and Diagnostic Findings:

- 1. Observe the signs and symptoms, such as:
- a. Pain or burning sensations,
- b. Any evidence of redness or burn in the mouth or throat,
- c. Pain on swallowing or an inability to swallow,
- d. Vomiting,
- e. Drooling;
- 2. Age and weight of the patient;
- 3. Pertinent health history.
- 4. Blood specimens are obtained to determine the concentration of drug or poison.

5. Efforts are made to determine what substance was ingested; the amount; the time since ingestion;

Management:

- 1. Control of the airway, ventilation, and oxygenation are essential.
- 2. In the absence of cerebral or renal damage, the patient's prognosis depends largely on successful management of respiration and circulation.
- 3. Measures are instituted to stabilize cardiovascular and other body functions.
- 4. ECG, vital signs, and neurologic status are monitored closely for changes.
- 5. An indwelling urinary catheter is inserted to monitor renal function.
- 6. Measures are instituted to remove the toxin or decrease its absorption.
- 7. The patient who has ingested a corrosive poison, which can be a strong acid or alkaline substance, is given water or milk to drink for dilution. However, dilution is not attempted if the patient has acute airway edema or obstruction or if there is clinical evidence of esophageal, gastric, or intestinal burn or perforation.

The following gastric emptying procedures may be used as prescribed:

- a. Syrup of ipecac to induce vomiting in the alert patient (never use with corrosive poisons)
- b. Gastric lavage for the obtunded patient; gastric aspirate is saved and sent to the laboratory for testing (toxicology screens)
- c. Activated charcoal administration if the poison is one that is absorbed by charcoal
- d. Cathartic, when appropriate
- e. If there is a specific chemical or physiologic antagonist (antidote), it is administered as early as possible to reverse or diminish the effects of the toxin.
- f. If this measure is ineffective, procedures may be initiated to remove the ingested substance. These procedures include administration of multiple doses of charcoal, diuresis (for substances excreted by the kidneys), dialysis, or hemoperfusion. Hemoperfusion involves detoxification of the blood by processing it through an extracorporeal circuit and an adsorbent cartridge containing charcoal or resin, after which the cleansed blood is returned to the patient.

Special consideration:

- 1. Throughout detoxification,
- a. The patient's vital signs, CVP, and fluid and electrolyte balance are monitored closely.
- b. Hypotension and cardiac dysrhythmias are possible.
- c. Seizures are also possible because of CNS stimulation from the poison or from oxygen deprivation.

- 2. If the patient complains of pain, analgesics are administered cautiously. Severe pain causes vasomotor collapse and reflex inhibition of normal physiologic functions.
- 3. After the patient's condition has stabilized and discharge is imminent, written material should be given to the patient indicating the signs and symptoms of potential problems related to the poison ingested and signs or symptoms requiring evaluation by a physician.
- 4. If poisoning was determined to be a suicide or self-harm attempt, a psychiatric consultation should be requested before the patient is discharged.
- 5. In cases of inadvertent poison ingestion, poison prevention and home poisonproofing instructions should be provided to the patient and family.

9.2. Carbon Monoxide Poisoning

Carbon monoxide poisoning may occur as a result of industrial or household incidents or attempted suicide. It is implicated in more deaths than any other toxin except alcohol. Carbon monoxide exerts its toxic effect by binding to circulating hemoglobin and thereby reducing the oxygen-carrying capacity of the blood.

Clinical Manifestations:

- 1. CNS symptoms predominate with carbon monoxide toxicity.
- 2. A person with carbon monoxide poisoning may appear intoxicated (from cerebral hypoxia).
- 3. Other signs and symptoms include headache, muscular weakness, palpitation, dizziness, and confusion, which can progress rapidly to coma.
- 4. Skin color, which can range from pink or cherry-red to cyanotic and pale, is not a reliable sign.
- 5. Pulse oximetry is also not valid, because the hemoglobin is well saturated. It is not saturated with oxygen, but the pulse oximeter indicates only if the hemoglobin is saturated; in this case, it is saturated with carbon monoxide rather than with oxygen.

Management:

Goals of management are to reverse cerebral and myocardial hypoxia and to hasten elimination of carbon monoxide. Whenever a patient inhales a poison.

The following general measures apply:

1. Carry the patient to fresh air immediately; open all doors and windows.

- 2. Loosen all tight clothing.
- 3. Initiate cardiopulmonary resuscitation if required; administer 100% oxygen.
- 4. Prevent chilling; wrap the patient in blankets.
- 5. Keep the patient as quiet as possible.
- 6. Do not give alcohol in any form or permit the patient to smoke.
- 7. In addition, for the patient with carbon monoxide poisoning, carboxyhemoglobin levels are analyzed on arrival at the ED and before treatment with oxygen if possible.
- 8. One hundred percent oxygen is administered at atmospheric or preferably hyperbaric pressures to reverse hypoxia and accelerate the elimination of carbon monoxide.
- 9. Oxygen is administered until the carboxyhemoglobin level is less than 5%.
- 10. The patient is monitored continuously.
- 11. Psychoses, spastic paralysis, ataxia, visual disturbances, and deterioration of mental status and behavior may persist after resuscitation and may be symptoms of permanent brain damage.
- 12. When unintentional carbon monoxide poisoning occurs, the health department should be contacted so that the dwelling or building in question can be inspected.
- A psychiatric consultation is warranted if poisoning was determined to be a suicide attempt.

9.3. Skin Contamination Poisoning (Chemical Burns)

Skin contamination injuries from exposure to chemicals are challenging because of the large number of possible offending agents with diverse actions and metabolic effects.

The severity of a chemical burn is determined by the mechanism of action, the penetrating strength and concentration, and the amount and duration of exposure of the skin to the chemical.

Management:

- 1. The skin should be drenched immediately with running water from a shower, hose, or faucet, except in the case of lye and white phosphorus, which should be brushed off the skin, dry.
- 2. The skin should be flushed with a constant stream of water as the patient's clothing is removed.
- 3. The skin of health care personnel assisting the patient should be appropriately

protected if the burn is extensive or if the agent is significantly toxic or is still present.

- 4. Prolonged lavage with generous amounts of tepid water is important.
- 5. Attempts to determine the identity and characteristics of the chemical agent are necessary in order to specify future treatment.
- 6. The standard burn treatment appropriate for the size and location of the wound (antimicrobial treatment, debridement, tetanus prophylaxis, antidote administration as prescribed) is instituted.
- 7. The patient may require plastic surgery for further wound management.
- 8. The patient is instructed to have the affected area reexamined at 24 and 72 hours and in 7 days because of the risk of underestimating the extent and depth of these types of injuries.

9.4. Food Poisoning

Food poisoning is a sudden illness that occurs after ingestion of contaminated food or drink. Botulism is a serious form of food poisoning that requires continual surveillance.

Assessment for food poisoning

1. The suspected food should be brought to the medical facility and a history obtained from the patient or family.

- 2. Ask the patient the following questions:
- a. How soon after eating did the symptoms occur? (Immediate onset suggests chemical, plant, or animal poisoning.)
- b. What was eaten in the previous meal? Did the food have an unusual odor or taste? (Most foods causing bacterial poisoning do not have unusual odor or taste.)
- c. Did anyone else become ill from eating the same food?
- d. Did vomiting occur? What was the appearance of the vomitus?
- e. Did diarrhea occur? (Diarrhea is usually absent with botulism and with shellfish or other fish poisoning.)
- f. Are any neurologic symptoms present? (These occur in botulism and in chemical, plant, and animal poisoning.)
- g. Does the patient have a fever? (Fever is characteristic in salmonella, ingestion of fava beans, and some fish poisoning.)

3. Food, gastric contents, vomitus, serum, and feces are collected for examination.

4. Because large volumes of electrolytes and water are lost by vomiting and diarrhea, fluid and electrolyte status should be assessed.

5. The patient is assessed for signs and symptoms of fluid and electrolyte imbalances, including lethargy, rapid pulse rate, fever, oliguria, anuria, hypotension, and delirium.6. Weight and serum electrolyte levels are obtained for future comparisons.

Management:

- 1. The key to treatment is determining the source and type of food poisoning.
- 2. The patient's respirations, blood pressure, level of consciousness, central venous pressure (CVP) (if indicated), and muscular activity are monitored closely.
- 3. Measures are instituted to support the respiratory system.
- 4. Measures to control nausea are also important to prevent vomiting, which could exacerbate fluid and electrolyte imbalances.
- 5. An antiemetic medication is administered parenterally as prescribed if the patient cannot tolerate fluids or medications by mouth.
- 6. For mild nausea, the patient is encouraged to take sips of weak tea, carbonated drinks, or tap water.
- 7. After nausea and vomiting subside, clear liquids are usually prescribed for 12 to 24 hours, and the diet is gradually progressed to a low-residue, bland diet.

Special consideration:

- 1. Severe vomiting produces alkalosis, and severe diarrhea produces acidosis.
- 2. Hypovolemic shock may also occur from severe fluid and electrolyte losses.

10. References:

Smeltzer, S.; Bare, B.; Hinkle, J.; and Cheever, K.: Textbook of Medical-Surgical Nursing, 12th ed., 20101, Philadelphia: Lippincott Williams and Wilkins .P.P.2168-2178.