

# Management of Poisoning and Overdose

Written by Dr. Niru Prasad

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MANAGEMENT OF POISONING AND OVERDOSE By Dr. Niru Prasad, M.D.,  
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**INTRODUCTION** Poisoning is a significant cause of mortality and morbidity in the United States. It is the fourth most common cause of death in children. Approximately 80% of accidental ingestion occurs in children under five years of age, the peak incidence being one and one-half to three years of age. With the adolescent group there is a high incidence of drug abuse and suicidal attempts. Adult poisoning is responsible for 10 to 20% of the calls to poison control. The majority of adult poisonings are due to toxic exposures - work related, suicide attempts, or secondary to drug abuse. Children under five years of age frequently ingest nontoxic materials like soaps, detergents, plants, vitamins, etc., or their parent's medication. The most significant exposures that need treatment at emergency rooms include salicylates, Tylenol, Phenobarbital, multivitamins, and iron overdose: as well as exposure to toxic fumes, ingestion of pesticides and petroleum distillates, etc.

**INITIAL CONTACT WITH THE POISONED PATIENT** It is very important to Obtain the basic information like name, age, address, and telephone number, the type of ingestion, and how long ago. Always request the family to bring the empty bottles or remaining pills for identification.

**INITIATION OF THERAPY AT HOME** Many accidental ingestions may be treated at home if the substance is nontoxic just by inducing vomiting. I have given a list of low toxicity ingestions. The dangerous substances that are often found in households include medications, dishwasher detergents, Drano, paint thinners, gasoline products etc. The poison control should be notified, and the family should be advised to bring the patient to the emergency room.

**PREVENTION OF ABSORPTION** The techniques to prevent further absorption can be initiated at home before the patient arrives at the emergency department -this includes both external and internal.

- 1.) External
  - a.) The clothing should be removed and the area of exposure should be thoroughly washed with soap and water. The eyes should be irrigated immediately with tap water for 15 to 20 minutes.
  - 2.) Internal
    - a.) For acid and alkali ingestion dilute with milk and water. Do not advise the patient to induce vomiting.
    - b.) For other poisonings as indicated by poison control vomiting can be induced at home with syrup of ipecac, or by gagging. The doses of syrup of ipecac are: 30 cc in adults and children 12 years and up. 15 cc in children 1 to 12 years. 10 cc in infants over nine months to eighteen months. Syrup of ipecac should be followed with 8 ounces of water in older children, and 15 cc/kg in toddlers. The patient should be ambulated. If vomiting does not occur in twenty minutes, repeat the dose. If after twenty minutes there is still no vomiting, prepare to do gastric lavage because absorption of ipecac may produce CNS depression. The contraindications to use of ipecac are: 1.) Comatose, stuporous, seizing, patient with no gag reflex. 2.) Acid and alkali ingestion. 3.) Hydrocarbon ingestions that do not contain camphor, heavy metals or pesticides. 4.) Ingestions involving CNS depressants like phenobarbital, etc.

**TRANSPORT TO HOSPITAL** It is very important to find out the condition of the patient. If he is alert, in no distress, the family could transport the patient. If the patient has altered sensorium or any breathing difficulty, then an ambulance should be called.

**MANAGEMENT IN THE EMERGENCY DEPARTMENT** It is very important to assess the cardiopulmonary status of the patient initially. This includes: A - Airway B - Breathing C - Circulation If the patient shows signs of upper airway obstruction such as stridor, drooling, absent gag reflex, intubation should be considered. Listen to the breath sounds in both lung fields, whether they are equal bilaterally,

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associated with rales, rhonchi, or wheezing, and check for circulation by assessing pulse, heart rate, blood pressure, and capillary refill of the finger nail beds. Any patient with altered mental status or unstable vital signs immediately begin: Oxygen 5 to 6 liters per minute. Cardiac monitor. IV lines - should be started immediately with 5% Dextrose, normal saline. Blood should be drawn for CBC, lytes, glucose with Dextrostix, ABG, PT, PTT, and toxic drug screening. Patient should receive 50 cc of 50% dextrose water (child 1 gm/kg dose), 2 ampules of Narcan and Thiamine 50-100 mg IV. Other considerations include: a complete history as to the time of ingestion, amount, and a good physical examination. A good history includes: A - Allergies. M Medications. P - Present and past illness. L Last meal, L.M.P, birth control pills. E - Events preceding, such as family fight, job stress, suicidal, etc. A good physical examination should focus towards cardiopulmonary and neurologic status of the patient, pulse, blood pressure, temperature, and mental status which is the fourth vital sign -initially should be documented. A - Alert. V - Responds to verbal stimuli. P - Painful stimuli. U - Unresponsive. Now check the skin for needle track marks, bruises, rash, smell for alcohol, etc; look for any evidence of trauma. In children think about child abuse. A good thorough physical examination will give clues towards the particular diagnosis. (I have attached a sheet in the back regarding the clues to diagnosis of unknown poisons with vital sign changes). The ABC of toxicology includes: A - Ipecac. B - Lavage. C - Charcoal and cathartics. D - Neutralizer. E - Antidote. Gastric lavage should be performed when indicated with large bore tube - 28 to 30 French in children, 36 to 40 French in adults. Lavage is indicated in patients who have ingested a potentially toxic substance and are seen within 3 to 5 hours of ingestion, and also in those with altered mental sensorium after having secured their airway. The patient should be in the left side with the head down position. The lavage fluid should be tap water or half normal saline 100 to 200 cc per pass in an adult 10 cc/kg in a child. The gastric aspirate should be sent for toxic screening if indicated, and following lavage, activated charcoal should be given. **ACTIVATED CHARCOAL** Adult dose - 30 to 50 grams Child dose - 1 gram per kilogram Multiple doses of charcoal are indicated in drugs with enterohepatic circulation such as Theophyllin, Digoxin, Phenobarbital, Butazolidin. The gastric tube should be left in place if multiple doses of charcoal are needed at 2 to 4 hour intervals. Drugs that are absorbed by charcoal include analgesics, anti-inflammatories, nonsteroidals, Morphine, Darvon barbituates, Valium, amphetamines, Atropine, Cocaine, Digitalis, etc. **CATHARSIS** Magnesium Sulphate is used as 20 grams dose in adults or 250 mg/kg in children. Saline cathartics are preferred. Sorbitol - 100 to 150 cc at 70% solution can also be used. The contraindications to cathartics are: Severe diarrhea. Intestinal obstruction. Renal failure. Heavy metal poisoning. The contraindications for emesis and lavage are: Acid/base ingestion. Seizures. Loss of gag reflex and hydrocarbon ingestions. The complications of lavage and ipecac are: Laryngospasms and cyanosis. Aspiration. Gastric erosion. Esophageal tear leading to mediastinitis. Foley's catheter should be placed as indicated because IV fluids, acidification, alkalinization of urine facilitates the excretion of poison. Urine should be sent for toxic screening. The excretion of poison can be facilitated by: 1.) Diuresis. 2.) Hemodialysis. 3.) Peritoneal dialysis. 4.) Hemoperfusion. 5.) Interruption of enterohepatic circulation. 6.) Exchange transfusion. Diuresis can facilitate the excretion of drugs with a small volume of distillation that are excreted by the kidneys. Alkali diuresis can facilitate the excretion of salicylate, phenobarbital, Lithium, etc. by ion trapping. Acid diuresis facilitates excretion of PCP,

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Strychnine. For alkali diuresis initially give IV fluid 20 cc/kg/hr - first one hour with sodium bicarbonate - 1 mg/kg to the IV. Add 1 amp of sodium bicarbonate to 1 liter of Dextrose water with added potassium and let run over one hour to monitor urine pH 7.5. Acid diuresis is not recommended due to its complications. Peritoneal dialysis should be considered if life threatening symptoms are present with toxic level of phenobarbital, Salicylates, Theophyllin, methanol, ethanol, Lithium, etc. Hemoperfusion with charcoal is useful for significant Theophyllin overdose, but it is controversial. Antidotes are discussed with specific poisons.

**DISPOSITION** Before discharging the patient specific attention must be focused on poison prevention with emphasis on discarding old medications, keeping toxic household products and dangerous drugs in locked cabinets. For patients with suicidal gestures, psychiatric consultation should be obtained. For possible battered child, social service consultation should be obtained, and if in doubt, admit the child. The family physician should be contacted, and follow-up visit should be arranged. For patients who need to be hospitalized, the hospital and the primary care physician should be contacted, and transport should be made with basic or advance unit as indicated. The poison control should be contacted for any antidote if it has been given, and for further follow-up. Now I will briefly discuss with you some of the most frequent overdose cases seen in the emergency room.

Toxic syndromes - these include:

- a.) Narcotics and sedative hypnotics - heroin, morphine.
- b.) Anticholinergic - antihistamine, over-the-counter cold medications, sleeping pills, tricyclic, etc.
- c.) Cholinergics - organophosphate and pesticides.
- d.) Sympathomimetics - amphetamine, cocaine.
- e.) Heavy metal poisoning - iron, lead, mercury.
- f.) Alcohol - ethanol, methanol
- g.) Analgesics - salicylates, Tylenol, etc.
- h.) Exposure to toxic gases, fumes, carbon monoxide.

The specific antidotes for most commonly encountered poisoning cases are listed in back. I will discuss with you tricyclic and other anticholinergic poisoning because we see and treat these patients very frequently in the emergency room, and the majority of these turn out to be suicidal. Anticholinergic drugs include Benadryl, Atropine, Compazine, tricyclic, Lomotil, OTC analgesic cold remedies, etc. These drugs are absorbed from the stomach and manifest symptoms within one to two hours. Certain plants containing anticholinergics are panther mushrooms, nutmeg, jimson weed, etc. These patients present with tachycardia, hypertension, flushed hot skin, bladder retention, and decreased bowel sounds. Tricyclic overdose presents with dysrhythmia with wide ARS, prolonged AV conduction, and heart block, Central anticholinergic effect include delirium, disorientation, and seizure activity. General supportive care and alkalinization of blood with sodium bicarbonate is indicated for tricyclic overdose. Dilantin and Lidocaine are used for cardiac arrhythmia. Physostigmine is used for seizures and refractory ventricle dysrhythmias. These patients require ICU admission for further management. Alcohol, ethanol, methanol, and ethylene glycol poisonings. Since alcohol abuse is becoming more popular among adolescents, and children can get hold of antifreeze, rubbing alcohol, certain mouthwashes and perfumes containing alcohol, general supportive management, as mentioned before, should be initiated. The toxic peak blood level of alcohol is over 100 mg/l cc/hr following acute ingestion. For ethanol, gastric emptying, IV fluids 5% dextrose with normal saline with added multivitamin and supplemental potassium is indicated. For life threatening emergencies related to any of these alcohols hemodialysis is considered. For alcohol withdrawal symptoms, besides general supportive measures, Ativan (lorazepam) or Valium is used. For acute ethanol and methanol 100% ingestion IV 1 cc/kg is used to maintain blood level of ethanol over 100 mg/cc. For acid and alkali ingestion leading to

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esophageal burn, besides general supportive measures, early esophagoscopy is indicated. Use of steroids and antibiotics are controversial. For acute salicylate poisoning, alkalinization of urine to maintain urine pH over 7.5, and urine output 3 to 4 cc/kg/hr is suggested. Remember the five stages of iron poisoning. Gastric lavage with 5% sodium carbonate and Desferrioxamine is the proper antidote following general supportive measures. For suspected carbon monoxide poisoning the clue to diagnosis is that several members of the same family come to the ER with headache, nausea, or shortness of breath. With toxic levels of carbon monoxide over 60 to 70% coma, seizures, and bradycardia result. 100% oxygen administered through a nonbreathing mask is the treatment of choice. Hyperbaric oxygen chamber is suggested for comatose patients. For hallucinogenic, PCP, LSD overdoses, besides general supportive measures, Haldol is used for sedation. For Phenothiazine overdose leading to oculogyric crisis IV Benadryl 25 to 50 mg with Cogentin 1 to 2 mg is given. In summary, poisoning and overdose constitutes significant ER patient visits, and these cases should be managed adequately with proper disposition. Tintinalli, Judith, Study Guide of Emergency Medicine, Volume I Rosen, Peter, Emergency Pediatrics, 2nd Edition Bryson, Peter, Comprehensive Review in Toxicology Hospital Physicians, Toxicologic Emergencies