DOCUMENT RESUME

ED 144 708 PS 009 577

TITLE Handbook of Common Poisonings in Children.
INSTITUTION Food and Drug Administration (DHEW), Washington, D.C.
REPORT NO HEW-FDA-76-7004
PUB DATE 76
NOTE 114p.
AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 017-012-00240-4, $1.50)

EDRS PRICE MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS Accident Prevention; *Children; Emergency Squad Personnel; *Government Publications; *Guides; Hospital Personnel; Pharmacists; Physicians; *Reference Books
IDENTIFIERS *Poisoning

ABSTRACT

This handbook for physicians, emergency room personnel and pharmacists lists the manufacturer, description, toxicity, symptoms and findings, treatment, and references for 73 poison substances considered by the Subcommittee on Accidental Poisoning of the American Academy of Pediatrics to be most significant in terms of accidental poisoning of children. (BF)

Handbook of Common Poisonings in Children

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service/Food and Drug Administration
5600 Fishers Lane/Rockville, Maryland 20857

HEW Publication No. (FDA) 76-7004

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1976

FDA

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.50
Stock No. 017-012-00240-4

FOREWORD

One of the basic missions of the Food and Drug Administration is preventive medicine. The Agency seeks to prevent injury and illness from harmful substances in the foods we eat; from drugs that may produce more risk than benefit; from unsafe medical devices; from dangerous sources of radiation; and from impure vaccines and blood destined for transfusion. All these programs are designed to protect the consumer against products that are supposed to be safe but sometimes are not due to lapses in design and development, manufacture, or processing.

All these programs protect children as well as adults. There is, however, another class of hazard involving children concerning which even our best efforts at prevention are insufficient. This class consists of products that are either not intended to be consumed, or are intended to be consumed in small amounts, but which, nonetheless, are consumed by children hundreds of thousands of times a year—far too often with fatal results.

When a child's natural curiosity, his desire to eat, and his lack of a well developed, protective sense of taste and smell lead to ingestion of a chemical substance, it is of vital importance that information concerning toxicology of such chemicals be readily available to physician, pharmacist, and parent alike.

Recognizing that a child's desire to explore every facet of his or her universe has too often led to tragedy, the Food and Drug Administration has published this *Handbook of Acute Common Poisonings in Children* from materals provided by the American Academy of Pediatrics.

Although limited to 73 toxic substances out of the thousands of potential hazards, these 73 are by far the most significant in terms of accidental poisoning of children. Therefore, the availability of the data in this book can materially speed the proper response when a child is exposed to a toxic chemical, at a time when speed is of basic importance.

Alexander M. Schmidt
Commissioner of Food and Drugs

American Academy of Pediatrics

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The Subcommittee also wishes to thank Sandra A. Anderson, Buffalo, New York, for assistance with the bibliography and Robert M. Smith, Birmingham, Alabama, for technical assistance.

CONTENTS

INTRODUCTION

Several years ago the Committee on Accident Prevention of the American Academy of Pediatrics began to explore the possibility of producing a practical handbook on acute poisoning in children. The Subcommittee on Accidental Poisoning was assigned the task of preparing the handbook. A number of formats were studied. The Subcommittee decided that it was not necessary to compete with several good current handbooks and texts on clinical toxicology and poisoning, despite the absence of a book exclusively concerned with children. Eventually, this handbook emerged.

Through the cooperation of the National Clearinghouse for Poison Control Centers, a list of the 200 most commonly reported toxic substances was provided. The Subcommittee added a few other common poisons to this list then chose the 73 items contained in this handbook.

For more than 15 years the National Clearinghouse for Poison Control Centers has provided Poison Control Centers in the United States with file cards containing brief descriptions, toxicity data, clinical signs and symptoms, and treatment for intoxications caused by most drugs and many other chemical agents. Using the basic text of these cards, the Subcommittee, with the magnanimous assistance of many experts throughout this country and Canada, produced this handbook. All of the cards were reviewed and most were extensively edited; some were entirely rewritten. Many new literature references were added and, wherever possible, special emphasis on treating the pediatric patient was made.

The Subcommittee believes that, in many areas, 70 to 80% of the calls regarding toxic episodes in children will be reflected by the items listed in this handbook. In a sense this handbook is a "pocket poison information center," and it is designed to help pediatricians, other primary physicians, emergency room personnel, and pharmacists. It is not intended to be used in a vacuum. The individual confronted with a poisoned patient should employ all necessary resources available: basic clinical judgment, other texts, poison information centers, and appropriate consultants. This handbook puts 73 of the most commonly consulted index cards in poison information centers in the hands of the therapist, thus providing a written adjunct to telephone consultations.

A medical consensus on the most appropriate approach to the treatment of all toxications is impossible to obtain. A number of the recommendations in this handbook are controversial and general. Amounts of poison encountered by the patient can rarely be quantitated. Mixtures of poisons produce therapeutic quan-

dries, and the condition of the patient before the toxic episode may contraindicate standard treatment. The 73 items in this handbook are offered only as a quick source of information about toxicity and as guidelines for initial emergency therapy.

GENERAL MANAGEMENT OF ACUTE POISONINGS

The first and most important principle in dealing with the child who has been poisoned or is suspected of having been poisoned is to treat the patient not the poison. The physician or other medical personnel first encountering the patient should organize a "team" effort. The most skilled should assess the patient's condition while someone else obtains a history and consults written toxicologic sources or calls the nearest Poison Information Center.

The person(s) directly in charge of the patient should attend to any need for airway, respiratory assistance, circulatory support, or control of seizures. If the poison was spilled on the patient, prompt removal or dilution with tap water is indicated, and the contaminated clothing should be removed in the process. If the poison is in the eyes, copious washing with water for 5-15 minutes should begin with all haste.

Save all substances that may be needed later for analysis, such as soaked clothing, vomitus, or the bottle.

If the poison was inhaled, remove the patient to uncontaminated air as the first step in therapy.

If the toxic substance is identified, specific directions for therapy should be provided by the member of the "team" who has checked the appropriate texts or other sources of toxicologic information.

Emesis

It the patient has ingested the toxic substance, induce emesis unless it is contraindicated. This is more effective than lavage. Ipecac Syrup is the method of choice for induction of emesis in patients more than 12 months of age in a dose of 15 ml for children or 30 ml for adults, administered orally, followed by 1 cup of water. This may be repeated once in 20 minutes if vomiting has not occurred. Induce emesis even if many hours have elapsed since the agent was swallowed. Contraindications for induction of emesis are:

1. some volatile hydrocarbon ingestions (see Kerosene),
2. ingestions of corrosives,

3. coma or convulsions,
4. frank shock,
5. strychnine poisoning.

Never use concentrated sodium chloride as an emetic. An alternate emetic is apomorphine hydrochloride, which can be given once in a dose of 0.07 mg/kg, subcutaneously. This drug can produce central nervous system depression of varying degrees and is not as broadly useful as Ipecac Syrup; however, it is faster acting.

Gastric Lavage

Gastric lavage should be reserved for use when emesis is contraindicated but when evacuation of the stomach is indicated and safe. Most experts do not recommend stomach evacuation by any means when corrosives have been ingested, except under extreme circumstances.

In children, the largest possible nasogastric or orogastric tube should be used. If the patient is comatose, seizing, or has lost the gag reflex, endotracheal intubation with a snug-fitting tube should precede lavage. Otherwise, patients may be lavaged in the head-down, left-side position without intubation, but a suction machine should be available. Always aspirate first to remove stomach contents, which can be saved for analysis if indicated. In children, normal saline should be used to avoid the danger of water intoxication, unless some other fluid is specifically indicated for a particular poison.

Activated Charcoal

Many toxic substances are well adsorbed by activated charcoal, and improved clinical response has been repeatedly demonstrated with its use. Some of the most common substances adsorbed by charcoal are: barbiturates, salicylates, narcotics, chloroquine, quinine, strychnine, atropine, camphor, digitalis, phenothiazines, phenol, parathion, ethclorvynol (Placidyl), glutethimide, and benzodiazepines (Librium, Valium, Dalmane, and Serax). Activated charcoal also adsorbs Ipecac Syrup and renders it ineffective. Commonly recommended doses of activated charcoal are approximately eight times the estimated amount of the ingested poison. (One heaping tablespoon of charcoal is 5 gm.) It can be drunk as a slurry in water or placed in the stomach at the conclusion of lavage. Charcoal has no known toxicity in these doses.

Some drugs not absorbed by charcoal are: boric acid, alcohols, corrosives, cyanide, and ferrous sulfate.

Emergency Care of Patient

When compared to the exceedingly large number of toxic substances in the environment, the number of specific, effective antidotes is miniscule. The *sine qua non* of first aid or emergency care of the poisoned child is expert supportive care and swift removal or adsorption of the poison.

Telephone Contact

Most physicians or emergency personnel make their first contact with a poisoning after a telephone call from a parent. When taking a call, always obtain the name and telephone number of the caller so contact can be reestablished if the connection is interrupted. Many first aid measures given here can be instituted at home if the ingested substance can be reliably identified. Whether or not Ipecac Syrup should be given prior to departure for the hospital or office depends on the nature of the ingestion and the contraindications previously enumerated. Careful, safe driving to the medical facility is always to be advised, and the parent should be reminded to bring the drug or poison, in its container, and any vomitus or other identifying substance with them.

Every toxic ingestion should be reported to the local Poison Information Center or the National Clearinghouse for Poison Control Centers.

Acetone

Type of Product: Solvent.

Manufacturer: Various.

Ingredients/Description: Acetone is a volatile, highly flammable liquid. It has a characteristic odor and a pungent, sweetish taste. It is widely used in chemical synthesis and as a solvent for resins, plastics, cellulose acetate, lacquers, varnishes, nail polishes, nail polish removers, rubber cement, glues, and so forth.

Toxicity: The toxicity of acetone is relatively low. It is absorbed by ingestion, inhalation, and slowly through the skin. It is rapidly excreted, mainly by the lungs (40 to 70% of an oral dose) and the kidneys (15 to 30%). Human adults given oral doses of 15 to 20 gm acetone daily for several days showed no ill effects other than slight drowsiness. Acetone has a threshold limit value (maximum safe air concentration) of 1,000 ppm; concentration should not exceed this value for

workers exposed 9 hours a day. Extensive studies on human subjects exposed repeatedly to concentrations averaging near 2,000 ppm over periods up to 15 years showed no injury in any individual.

Symptoms and Findings: The effects of acetone are similar to ethyl alcohol for equal blood levels, but the anesthetic potency is greater. Exposure to high vapor concentrations, well above those easily recognizable by odor (e.g., 9,000 ppm), cause eye, nose, and throat irritation. Inhalation of high (anesthetic) concentrations of acetone may cause restlessness, headache, inflammation of mucous membranes and the gastrointestinal tract, with vomiting and hematemesis, ketosis, fatigue, central nervous system depression, incoordination, stupor, narcosis, and coma. Ingestion produces the same symptoms. No serious systemic injury has been reported. Prolonged skin contact may produce dermatitis because of its defatting action, but the slow absorption through the skin does not appear to be of toxicologic significance. Transient eye irritation is reported as moderate, and complete healing of contaminated eyes can be expected.

Treatment: *Ingestion*—if a large amount is ingested, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline.

Inhalation—Remove from exposure. Support ventilation (artificial respiration, oxygen). Symptomatic and supportive otherwise.

Eyes—Flush thoroughly with water.

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Alkali

Type of Product: Ingredient in cleansers and disinfectants.

Manufacturer: Various.

Ingredients/Description: Sodium hydroxide, potassium hydroxide, wood ash lye, sodium or potassium carbonate. Pure or concentrated products occur as liquid, crystals, or compressed beads. Many products—both liquid and solid—contain these agents.

Toxicity: The corrosive action of all compounds depends on the concentration of base at the mucosal surface. Therefore, the size of the dose is not the only determinant of toxicity. The larger the dose, the more certain the burn. Estimates of the lethal dose range between 5 and 30 gm, depending on the chemical ingested.

Symptoms and Findings: Burning pain in mouth, throat, and stomach. Nausea. Vomitus containing mucous and later containing blood. Pulse is feeble; respiration is fast and shallow. Skin is cold and clammy. Collapse ensues. Death may be the result of shock or asphyxia and glottic edema. Following apparent improvement, the patient may, in 2 to 4 days, develop sudden pain in the abdomen or chest and shock indicating perforation of stomach or esophagus. Esophageal stricture may develop as a late complication.

Treatment: Do not induce emesis or perform gastric lavage. Neutralize (milk) and dilute (large amounts of water). Tracheostomy is indicated for obstruction from laryngeal edema. Maintain circulation (fluids, plasma, drugs). Surgery for perforation. Many authorities believe the esophagus should be put at rest until the acute inflammatory process subsides (3 or 4 days); therefore, parenteral fluids should be administered. However, some authorities would institute a liquid diet if tolerated. Cortisone given within the first 24 to 48 hours after the poisoning has shown a suppressive effect on inflammatory response of injured tissue in experimental animals. As a result of this work, cortisone has been used in humans after the ingestion of lye. Cortisone is administered within the first 24 to 48 hours (Prednisone, 1 to 2 mg/kg) and is given daily over a 2-week period. Although results with cortisone (or its equivalent) are suggestive of a decreased incidence of stricture formation, results are not definitive but need further investigation. The timing of esophagoscopy for determining the extent of corrosive damage

is controversial, some believe it should be done within the first 24 hours, and others feel that a delay of 48 to 72 hours may allow the edema to subside so a more thorough examination is possible. The degree of stricture formation may be followed with serial esophagograms. Antibiotics should be given because of danger of secondary infections.

External burns should be washed with large volumes of water.

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Amphetamine

Type of Product: Central nervous system stimulant, sympathomimetic agent.

Manufacturer: Various. Refer to specific drug in **Physicians' Desk Reference.**

Ingredients/Description: The drugs in this class include amphetamine sulfate (Benzedrine), amphetamine phosphate (Raphetamine), dextroamphetamine sulfate (Dexedrine, d-Amfetasul, Cendex, Amsustain, Dexalone, Pomadex, Zamitam), amphetamine-dextroamphetamine resin (Biphetamine), dextroamphetamine tannate proctocolloid (Synatan), methamphetamine hydrochloride (Amphedroxyn, Desoxyn, Drinalfa, Methedrine, Norodin, Syndrox), and other sympathomi-

metic amines such as levamphetamine (Levonor, Cydril, Mangret) diethylpropion (Tenuate, Tepanil), phenmetrazine (Preludin), benzphetamine (Didrex), phendimetrazine tartrate (Plegine), phentermine hydrochloride (Wilpo), phentermine resin (Ionamin), chlorphentermine hydrochloride (Pre-Sate). Amphetamines are frequently encountered in drug abuse situations and are called by the following "street" names: Speed, Ups, Bennies, A's, Footballs, Pep Pills, Crossroads, Purple Hearts, Go-Pilots, and Wakeups. "Speed freaks" are intravenous amphetamine users.

Toxicity: A lethal dose for a child can be as little as 5 mg/kg and 20 mg/kg for an adult. There is considerable individual variation in the response to these drugs, and there are indications that children are more susceptible to toxicity than adults. Amphetamine in doses of 30 mg has caused severe reactions, yet doses of 400 to 500 mg have been survived. Death in adults has resulted from as little as 120 mg ingested amphetamine. External stimuli increase the state of hyperactivity in acute intoxication. Large doses can be tolerated after chronic use of the drug. Inasmuch as these drugs are frequently combined with a barbiturate, it is important to treat the patient accordingly.

Symptoms and Findings: Nausea, vomiting, dry mouth with fo[illegible] odor, dilated pupils, hallucinations, psychosis with peculiar repetitive mannerisms of extremities or mouth or jaw, delirium, spasms, convulsions, and coma can occur. Central nervous system effects commonly include lassitude, restlessness, dizziness, tremor, hyperreflexia, talkativeness, tenseness, irritability, hyperpyrexia, and insomnia. Cardiovascular effects include headache, chilliness, sweating, pallor, flushing, palpitation, cardiac arrhythmias, angina, hypertension or hypotension, and circulatory collapse. The presence of sweating differentiates this from an atropine ingestion.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Give charcoal slurry. Minimize external stimuli. Sedation may be beneficial. Adequate sedation is difficult to achieve with safety and may, in fact, aggravate postexcitatory depression. Chlorpromazine (Thorazine) is beneficial in the treatment of amphetamine poisoning. However, when an amphetamine-barbiturate drug combination has been taken, a smaller dose of chlorpromazine must be used to minimize the postexcitatory depression from the barbiturate. The dosage recommended for treatment of amphetamine ingestions is 1 to 2 mg/kg, IM, of chlorpro-

mazine, and subsequent treatment as directed by the recurrence of excitation and concomitant hypertension. In patients who are exhausted or have ingested an amphetamine-barbiturate combination, the initial dose of chlorpromazine should not exceed 0.5 mg/kg, IM. Chlorpromazine can be used if the ingestion poses a threat to life or seizures have occurred. It only terminates the central nervous system effects. In drug abuse, contaminants are frequently mixed with amphetamines. Hypothermia has been used and may be beneficial. Vitamin C is reported to accelerate metabolism; urinary acidification increases excretion. Hydration is important.

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Arsenic

Type of Product: Pesticide.

Manufacturer: Various.

Ingredients/Description: Powder often in combination with other ingredients.

Toxicity: Acute poisoning usually is associated with accidental ingestion of arsenic-containing pesticides.

Symptoms and Findings: Gastroenteritis, burning pains in esophagus and stomach, vomiting; watery or bloody diarrhea; dehydration with thirst and muscular cramps; occasional con-

vulsions, stupor, cold, clammy skin; coma. Death may result from circulatory failure. If chronic overexposure is suspected, check for diarrhea, hyperpigmentation, hyperkeratosis, circumscribed edema (lower eyelids and ankles), and Meier's lines, garlic breath, excessive salivation and sweating, mental changes, and polyneuritis. Neurologic manifestations, if present, are refractory to treatment.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO; followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with a large quantity of normal saline, followed by a glassful of milk. Morphine may be used to control abdominal pain. BAL (dimercaprol) is an effective chelating agent for arsenic. It should be used whenever symptoms are present or urine assay for arsenic reveals a concentration above 10 μg per deciliter or an excretion rate of 50 μg per 24 hours. BAL in oil, 500 mg/M^2/24 hours in divided dose every 4 hours by deep intramuscular injection. Taper the dose after 48 hours; consult standard pharmacology books for exact details. Give intravenous fluids to correct dehydration and electrolyte deficiencies. Treat shock with oxygen, blood, and fluids as needed.

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Atropine

Type of Product: Anticholinergic alkaloid. Belladonna alkaloid.

Manufacturer: Various.

Ingredients Description: An ingredient in many gastrointestinal and ophthalmic preparations as well as plants such as jimsonweed and deadly nightshade.

Toxicity: The fatal dose for adults is usually estimated to be 0.1 gm, but adults have recovered from single doses of as much as 1.0 gm; 0.01 gm usually produces severe distress in adults.

The estimated lethal dose for children (extremely sensitive) is 0.01 gm. Intoxication in young children has been reported from administration of eye drops.

Symptoms and Findings: Dilated pupils, blurred vision, and possible photophobia, dry burning sensation of mouth; excessive thirst, difficulty in swallowing and talking; hyperthermia; generalized flushing (an erythematous rash may appear; this is more common in children), hot, dry skin, headache; nausea; excitement; confusion, delirium; convulsions; rapid pulse (may not be prominent in infants; palpitations in adults); rapid respirations, and urinary urgency with difficulty in micturition. Abdominal distension is possible in infants. Large amounts of atropine cause paralysis, coma, and circulatory collapse. Duration of action may be 48 hours or longer. Death results from respiratory failure.

Treatment: If ingested, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline if convulsions are not imminent. Give saline cathartic. For notable excitement give paraldehyde, diazepam, or phenobarbital cautiously (depression occurs late in belladonna poisoning). Support respiration. Ice bags or tepid water sponges for hyperthermia. Check for urinary retention and catheterize if necessary. Physostigmine salicylate is an antidote in severe intoxication from atropine and other anticholinergic drugs. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. The lowest effective dose should be repeated if life-threatening signs recur. Neostigmine is ineffective in reversing the effects of atropine on the central nervous system.

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Barbiturates

Type of Product: Sedatives, hypnotics, and anticonvulsants.

Manufacturer: Various. Refer to specific drug in **Physicians' Desk Reference.**

Ingredients/Description: See Tables 1 and 2. Barbiturates are readily absorbed following oral administration and are reversibly bound to serum albumin. Most of the barbiturates are metabolized chiefly, but not solely, in the liver. The longer-acting barbiturates have a higher urine percentage of unchanged drug.

Toxicity: Intoxication with short-acting barbiturates causes deep and rapid onset of coma and severe complications. Alcohol and barbiturates may cause deeper coma than anticipated for the serum barbiturate level. Alcohol or tranquilizer concomitant ingestions may interfere with the serum level-clinical state correlation. Addicts and epileptics have highest tolerances.

Hypnotic dose for child—5 mg/kg, for adult—200 mg (total dose). *Average toxic dose*—5 times hypnotic dose. *Average fatal dose*—10 to 15 times hypnotic dose.

Symptoms and Findings: *Low toxic dose*—decreased sensory ability (6 mg/kg). *Medium toxic dose*—decreased motor ability. *High toxic dose*—Decreased medullary activity.

Moderate intoxication resembles alcoholic inebriation. The patient is comatose in severe intoxication, and the level of reflex activity conforms in a general way to the intensity of the central depression. There is drowsiness, a transient period of confusion and excitement, ataxia, vertigo, slurred speech, headache, and paresthesias. Stupor progresses to coma, progressive loss of deep reflexes, and response to pain. Babinski reflex is positive. Respiration is affected early. Breathing may be slow or rapid and shallow. Cheyne-Stokes rhythm may be present. Respiratory minute volume is diminished, and hypoxemia and respiratory acidosis may develop. Progressive cardiovascular collapse with weak, rapid pulse, cold sweating skin, hypotension, and cyanosis. Respiratory complications (atelectasis, pulmonary edema, and bronchopneumonia) and renal failure frequently occur. Death is caused by respiratory arrest.

Bullous skin lesions suggest coma over 12 hours' duration. Pupils are initially small and dilate terminally.

TABLE 1
Barbiturates

Long Acting	Intermediate Acting	Short Acting	Ultra Short Acting
Barbital (Veronal)	Pentobarbital (Nembutal)	Secobarbital (Seconal)	Thiopental (Pentothal)
Phenobarbital (Luminal)	Amobarbital (Amytal)	Allylbarbituric acid	Thiamytal (Surital)
Mephobarbital (Mebaral)	Butabarbital (Butisol)		
	Vinbarbital (Delvinal)		
	Probarbital (Ipral)		

TABLE 2
Actions of Barbiturates

Action	Long Acting	Intermediate Acting	Short Acting	Ultra Short Acting
Action peak	6 hr.	3–6 hr.	3 hr.	Seconds
Onset	1 hr.	1 hr.	Minutes	Seconds
Dose duration	10–12 hr	6–8 hr.	4–8 hr.	Minutes
Potential	65–75 mg/kg	3 gm	40–50 mg/kg	
Fatal dose	Barbital 10 gm *Phenobarb* 5 gm		3 gm	
Fatal blood				
Level (mg/100 ml)	*Phenobarb* 8–10	3.5	3.5	
Coma level (mg/100 ml)	*Phenobarb* 3	1–2	1–2	

Treatment:

1. Induce emesis—Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary.
2. Perform gastric lavage with normal saline; useful first 1 to 4 hours. Use cuffed endotracheal tube if coma present.
3. Give activated charcoal slurry after emesis.
4. Maintain clear airway.
5. Anoxia prevention and treatment—intubation, tracheostomy, and respirator as needed.
6. Correct hypotension with adequate respiratory care and hydration. Vasopressors (metaraminol) may be necessary.
7. Forcer diuresis (if not in shock) using ethacrynic acid, furosemide, or mannitol will promote excretion of even the short-acting barbiturates. (May add sodium bicarbonate to enhance excretion in phenobarbital poisoning).
8. Peritoneal dialysis, even with the addition of albumin, is only about twice as effective as osmotic diuresis.
9. Hemodialysis is 10 times more effective than peritoneal dialysis and should be considered for the following indications: (a) ingestion of a potentially fatal dose, (b) potentially fatal blood levels, (c) progressive deterioration with conservative therapy, (d) prolonged coma, (e) renal or hepatic failure with impaired excretory routes.

References

Hadden, J., Johnson, K., Smith, S., Price, L., and Giardina, E.: Acute barbiturate intoxication Concepts of management. J A M.A., 209:839, 1969.

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Setter, J. G., Maher, J. F, and Schreiner, G. E.: Barbiturate intoxication. Evaluation of therapy including dialysis in a large series selectively referred because of severity. Arch. Intern. Med., 117:224, 1966.

Shubin, H., Weil, M. H: Shock associated with barbiturate intoxication. J A M.A., 215:263, 1971.

Ben Gay Ointment

Type of Product: Analgesic rub.

Manufacturer: Leeming/Pacquin, 100 Jefferson Road, Parsippany, New Jersey 07054.

Ingredients/Description: Lanolin, 50%; synthetic waxes, 10%; methyl salicylate, 18%; menthol, 16%; water, Q.S.

Toxicity: Methyl salicylate is extremely toxic. As little as 5 cc of pure methyl salicylate has been fatal to a child. One teaspoonful (5 cc) is equivalent in toxicity to about 12 aspirin tablets (325 mg each). Menthol is also toxic and has a lethal oral dose of 800 to 1,600 mg in cats. The usual ingestion of Ben Gay does not approach these levels.

Symptoms and Findings: Gastritis, vomiting, tinnitus, hyperpnea, acid-base disturbances, hypoglycemia, delirium, convulsions, coma, and respiratory failure (see Salicylates, page 82).

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. After evacuation of stomach, administer activated charcoal. The absorption may be delayed for hours.

References

Gleason, M N, Gosselin, R E, Hodge, H C, and Smith, R. P Clinical Toxicology of Commercial Products Acute Poisoning, ed 3 Baltimore Williams and Wilkins, 1969

Leeming/Pacquin, information from manufacturer

Von Oettingen, W F. Poisoning: A Guide to Clinical Diagnosis and Treatment, ed 2 Philadelphia: W. B Saunders, 1958

Beta-Chlor

Type of Product: Hypnotic and sedative.

Manufacturer: Mead Johnson and Company, Evansville, Indiana 47721.

Ingredients/Description: Each Beta-Chlor tablet contains chloral betaine, 870 mg (equivalent to chloral hydrate, 500 mg).

Toxicity: The central nervous system depression produced by chloral betaine in laboratory animals is approximately equivalent to that of chloral hydrate when dosage is calculated in terms of chloral hydrate content. The mean lethal dose of chloral hydrate for adults is approximately 10 gm (20 Beta-Chlor tablets). Death has been reported to occur from as little as 4 gm This product is detoxified in the liver and other tissues.

Symptoms and Findings: Gastric irritation, vomiting, hypotension, and excitement, followed by central nervous system depression, severe vasodilatation, hypothermia, slow respiration, cardiac arrhythmias, stupor, cyanosis, occasionally delirium, hypotension, pin point pupils. If the patient survives, there may be icterus and albuminuria.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water. repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Maintain respiration. Maintain blood pressure with levarterenol, IV. Symptomatic and supportive otherwise.

References

Mead-Johnson Laboratories, information from manufacturer
National Clearinghouse for Poison Control Centers, Washington, D.C., card file index
Nordenberg, A., Delisle, G., and Izukawa, T.: Cardiac arrhythmia in a child due to chloral hydrate ingestion. PEDIATRICS, 47:134, 1971.

Campho-Phenique

Type of Product: Topical antiseptic.

Manufacturer: Glenbrook Laboratories, Division of Sterling Drug Incorporated, 90 Park Avenue; New York, New York 10016.

Ingredients/Description: Comes in both liquid and powder. Liquid—phenol, 4.75%; camphor, 10.86%. Powder—phenol, 2%; camphor, 4.38%.

Toxicity: Phenol has an estimated fatal dose of 2 gm according to one source; however, other authorities place the fatal dose higher. Much greater doses have been tolerated. Phenol has a corrosive effect on mucous membranes and skin. Camphor has an estimated fatal dose of 1 gm in a 1-year-old child (see Camphor, page 16).

Symptoms and Findings: Corrosive burns of mucous membranes in mouth and esophagus may occur. Abdominal pain and vomiting may be followed by bloody diarrhea, headache, dizziness, and tinnitus. Shock may occur in severe cases. Convulsions may be seen in children. If death does not occur promptly from respiratory failure, moderately severe renal insufficiency or pulmonary edema may occur. Large doses of camphor can cause vertigo, confusion, delirium, convulsions, coma, and respiratory failure.

Treatment: Dilute with milk or water. Give demulcents and maintain body temperature. Intravenous sodium bicarbonate has afforded symptomatic relief in some patients even though they were not severely acidotic. Treat shock but avoid overhydration because of uncertain cardiac and renal status. Use supportive measures for impending renal insufficiency. Treat convulsions with diazepam (0.5 to 0.1 mg/kg, IV). Watch

for esophageal stricture even though it occurs only rarely after phenol poisoning.

References

Dreisbach, R. H.: Handbook of Poisoning: Diagnosis and Treatment, ed. 8. Los Altos, California: Lange Medical Publishers, 1974.

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3. Baltimore: Williams and Wilkins, 1969.

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Stecher, P. G., ed.: The Merck Index: An Encyclopedia of Chemicals and Drugs, ed. 8. Rahway, New Jersey: Merck, 1968.

Camphor

Type of Product: Topical skin medication.

Manufacturer: Various.

Ingredients/Description: Most cases of camphor intoxication have arisen from accidental ingestion of Camphor Liniment (Camphorated Oil) which contains 20% camphor. Camphor is present in Camphor Spirit (10%), Camphor and Soap Liniment (4.5%), and Campho-Phenique (10%). Camphor is frequently used in conjunction with menthol or phenol for its local anesthetic effect to relieve itching of the skin.

Toxicity: The ingestion of 2 gm generally produces dangerous effects in an adult, although more than 40 gm have been ingested with recovery. Approximately 1 teaspoonful of liniment (0.7 to 1.0 gm) has proven fatal to children. A 19-month-old infant died after swallowing 1 teaspoonful of camphorated oil in spite of the fact that he vomited a few minutes later. A 1-year-old boy who ingested 120 ml of camphorated oil convulsed in 15 minutes; prompt gastric lavage and mouth-to-mouth ventilation were responsible for his survival. A 77-year-old man, who mistakenly ingested 60 ml of camphorated oil, vomited and suffered several major motor seizures 30 minutes later.

Symptoms and Findings: Nausea, vomiting, feeling of warmth, headache, confusion, vertigo, excitement, delirium, or increased muscular excitability may be present. Convulsions, followed by depression. Coma. Death results from respiratory failure or from status epilepticus.

Treatment: Induction of emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary)

or gastric lavage with normal saline should be accomplished before symptoms appear—not during convulsions. Treatment is aimed at the prevention and control of convulsions. Diazepam (0.05 to 0.1 mg/kg, IV) is a useful adjunct in treating status epilepticus and severe, recurrent, convulsive seizures. Administration of oxygen and respiratory support may be indicated. Avoid the administration of oils or alcohol which may promote absorption of camphor. Do not use opiates.

References

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Gleason, M N., Gosselin, R. E., Hodge, H C, and Smith, R P Clinical Toxicology of Commercial Products Acute Poisoning, ed. 3 Baltimore Williams and Wilkins, 1969

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Osol, A, Pratt, R, and Altschule, M The United States Dispensatory and Physicians Pharmacology, ed. 26 Philadelphia: J B Lippincott, p 234, 1967

Chlordane

Type of Product: Insecticide.

Manufacturer: Various.

Ingredients/Description. Technical grade chlordane consists of the A and B chlordane, heptachlor, trichlor, related materials, and a small percentage of hexachlorocyclopentadiene. It is less toxic, both acutely and chronically, than chlordane made prior to 1950 because of improved production methods.

Toxicity: The ingredients mentioned here and contained in a technical grade chlordane are generally more toxic than chlordane; but, they are present in only small amounts. Chlordane is readily absorbed percutaneously. Although the human fatal dose has been estimated at 6 to 60 gm, the fatal dose is probably closer to 6 gm; and, convulsive symptoms have occurred with as little as 10 mg/kg. As little as 100 mg may cause severe poisoning in a child. Topical skin application of about 30 gm to a human adult caused death in 40 minutes.

Symptoms and Findings: Central nervous system excitement and convulsions, which may be intermittent. Possible chemical burns of the mouth and throat. Severe gastritis, enteritis,

diffuse pneumonia, and renal damage. Hepatotoxic effects are a possible late manifestations. Terminal mania and death may not occur until several days after ingestion.

Treatment: *Skin*—Remove clothes as soon as possible and wash thoroughly with soap and water.
Ingestion—Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline Diazepam (0.1 to 0.2 mg/kg, IV) should be used to control convulsions. Maintain respirations with oxygen or supported ventilation if necessary. Avoid epinephrine because of the danger of inducing venticular fibrillation. Avoid fats and oils by mouth because they aid absorption. All other treatment is symptomatic and supportive.

References

Dreisbach, R. H Handbook of Poisoning Diagnosis and Treatment, ed 8 Los Altos, California Lange Medical Publishers, 1974.

Hayes, W J Clinical Handbook on Economic Poisons Emergency Information for Treating Poisoning P H S Publication 476, rev Atlanta, Georgia U S. Communicable Disease Center, Toxicology Section, 1963

National Clearinghouse for Poison Control Centers, Washington, D C, card file index

Chlorine Gas

Type of Product: Industrial gas used for manufacturing and as a disinfectant.

Manufacturer: Various.

Ingredients/Description: A greenish-yellow gas used commercially as a disinfectant. Chlorine gas is liberated from household bleaches, particularly in the presence of acids. Hydrochloric acid is formed in water.

Toxicity: Exposure to chlorine gas will produce varying degrees of pulmonary and airway damage, depending on the severity of exposure. Concentrations of 40 to 60 ppm are dangerous, and a concentration of 1,000 ppm (0.1%) is invariably and rapidly fatal. Cases may be classified as mild, moderate, or severe.

Symptoms and Findings: *Mild*—Minimal sensation of burning of mucous membranes of nose, mouth, throat, and perhaps the eyes is present. There may be a slight cough. *Moderate*—Immediate, severe irritation of the mucous membranes of the

nose, throat, and eyes is accompanied by a distressing, sometimes paroxysmal, cough. Anxiety is usually present. Except for a few rales, physical examination is normal. X-ray of the lungs is negative *Severe*—Severe, productive cough; difficulty in breathing, and frequently cyanosis are present. Vomiting may be severe Restlessness and apprehension are often severe. Rales may be heard throughout the lungs. X-ray of the lungs may be negative, but the expirogram may show considerable expiratory reduction.

Treatment: *Mild*—None; symptoms will clear within a few minutes to an hour. *Moderate*—Have the patient lie down with his head and shoulders elevated. Administer oxygen in periods of a few minutes at a time until the cough and anxiety are relieved A sedative cough syrup is useful. Most patients can be up within a few hours and may return to full activity the following day *Severe*—Rest with head and shoulders elevated, warmth, and reassurance. Inhalation of oxygen for periods of 15 minutes or longer is effective in alleviating the symptoms and should be repeated as necessary. Sedative cough syrups are indicated. Productive cough, bronchial rales, and an abnormal expirogram may persist for a day or two. Residual pulmonary damage rarely occurs. Most of these patients are able to return to full activity on the following day.

If a child has been trapped in an area of high concentration of chlorine gas, the physician is confronted with a medical emergency. Shock, coma, and respiratory arrest may be present. Treatment is supportive, and the physician must rely on his clinical judgment to meet the conditions at hand. Resuscitation measures, including inhalation of 100% oxygen and methods to combat shock, may be required. Corticosteroids may be helpful for pulmonary edema. Complications such as pneumonia should be anticipated. Intermittent positive pressure breathing with oxygen for acute pulmonary edema may be required. The use of nebulized bronchial dilators for bronchial spasm, and nebulized bronchial detergent for increased mucous secretions may be helpful.

References

Adelson, L, and Kaufman, J Fatal chlorine poisoning Report of two cases with clincopathologic correlations Amer J Clin Pathol., 56 430, 1971

Arena, J M. Poisoning Toxicology—Symptoms—Treatments, ed 3. Springfield, Illinois Charles C Thomas, 1974.

Gay, H H.: Exposure to chlorine gas. J A M A, 183:806, 1963

Noe, J T: Therapy for chlorine gas inhalation. Ind. Med. Surg., 32:411, 1963.

Clorox

Type of Product: Household liquid chlorine bleach.

Manufacturer: The Clorox Company, P. O. Box 7343, Oakland, California 94601.

Ingredients/Description: Sodium hypochlorite, 5.25%; sodium carbonate, 0.2%; sodium chloride, 4%; free sodium hydroxide, 0.01%.

pH of this product is 11.2; available chlorine, 5%.

Toxicity: *Alkaline irritation.* At one time it was customary to classify liquid chlorine bleach with corrosive alkalies; however, animal experimentation and human experience following ingestion of Clorox and other liquid chlorine bleaches has not substantiated such a classification.

Symptoms and Findings: *Ingestion*—Burning sensation and irritation of mucous membranes with prompt emesis. Although symptoms simulating alkali ingestion have been reported, few serious complications from hypochlorite ingestion have been reported to the National Clearinghouse for Poison Control Centers. It appears that hypochlorite ingestion does not usually cause serious or permanent injury to the esophagus, and perforation or stricture formation is extremely unlikely.

Inhalation—Gas produced by mixing chlorine bleach with strongly acidic products such as toilet bowl cleaners, rust removers (chlorine gas), or household ammonia (chloramine gas) are irritating to mucous membranes, eyes, and upper respiratory tract. It is unlikely that harmful quantities would be inhaled unless confined to an extremely small area. (see Chlorine Gas Exposure, page 18).

Treatment: *Ingestion*—Dilute at once with milk, water, aluminum hydroxide gel, or milk of magnesia. Avoid acids. Consider cautious gastric lavage (avoid aspiration) if a large quantity was ingested and emesis has not occurred. Give demulcents. Treatment is otherwise symptomatic and supportive. The necessity for esophagoscopy is controversial.

Inhalation—Symptomatic and supportive. Observe for pulmonary edema (see Chlorine Gas Exposure, page 18).

References

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Pike, D. G., Peabody, J. W., Davis, E. W., and Lyons, W. S.: A re-evaluation of the dangers of Clorox ingestion. J. Pediat., 63:303, 1963.

Cologne

Type of Product: Essences, after shaves, and similar cosmetic products.

Manufacturer: Various.

Ingredients/Description: General Formula—from compilation of many trade formulations: ethanol, 60%; perfume, 10%.

In addition, colognes may contain small amounts of the following: humectants, ultraviolet ray absorbers, emollients, and water.

Toxicity: Toxicity of cologne is dependent on the ethanol content.

Symptoms and Findings: Possible central nervous system depression and gastrointestinal irritation. Hypoglycemia and convulsions have been reported in children from ethyl alcohol.

Treatment: Administer demulcent. Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary), or perform gastric lavage with normal saline if a large quantity was ingested. Treat symptomatically but avoid depressant medications (see Ethyl Alcohol, page 44).

References

Cummins, L. H: Hypoglycemia and convulsions in children following alcohol ingestion. J. Pediat., 58:23, 1961.

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3. Baltimore: Williams and Wilkins, 1969.

Gumpel, R. C, and Kaufman, E H.: Alcohol-induced hypoglycemia. N.Y. State J. Med., 64:1014, 1964.

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Congesprin

Type of Product: Analgesic; nasal decongestant.

Manufacturer: Grove Laboratories, Incorporated, St. Louis, Missouri.

Ingredients/Description: Each two-layered (orange and white) tablet is engraved with a "C" and contains: aspirin, 81 mg; phenylephrine hydrochloride, 1.25 mg; magnesium hydroxide, 31 mg.

Toxicity: Aspirin has a toxic dose of 150 to 200 mg/kg and a probable mean lethal dose for adults of 20 to 30 gm. Phenylephrine hydrochloride is poorly absorbed after oral ingestion. 90 mg has been ingested by 2- and 3-year-old children without symptoms, and single oral doses as high as 250 mg have been used in treatment of hypotension.

Symptoms and Findings: Hyperpnea, vomiting, irritability, tinnitus, hyperpyrexia, perspiration, confusion, convulsions, coma. Respiratory alkalosis. Metabolic acidosis in young children. (See Salicylates, page 82.)

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Then give activated charcoal as a slurry. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV) (See Salicylates, page 82.)

References

Grove Laboratories, information from manufacturer
National Clearinghouse for Poison Control Centers, Washington, D C, card file index

Contac

Type of Product: Cold capsules (antihistamine, sympathomimetic, anticholinergic).

Manufacturer: Menley and James Laboratories, Philadelphia, Pennsylvania.

Ingredients/Description: In bottles of 10, 20, and 40 sustained-release capsules. Each capsule contains belladonna alkaloids, 0.25 mg, phenylpropanolamine hydrochloride, 50 mg; chlorpheniramine maleate, 4 mg.

Toxicity: Phenylpropanolamine hydrochloride, the major toxic ingredient, has an estimated minimum lethal dose of 200 mg for a child less than 2 years old and of 2,000 mg for an adult. Belladonna alkaloids (atropine, scopolamine) are fatal at a dose as low as 10 mg for a young child, and 100 mg for an adult. Chlorpheniramine maleate is estimated to be fatal at a dose of 5 to 10 mg/kg.

Symptoms and Findings: Headache, nausea, vomiting, dryness of mouth, vertigo, blurred vision, mydriasis. These may be followed by central nervous system stimulation with nervousness, excitement, dyspnea, hypertension, tachycardia, palpita-

tions, cardiac arrhythmias, tremors, convulsions. Terminal central nervous system depression occurs with coma and respiratory failure.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) unless comatose or convulsing, or perform gastric lavage with normal saline. Then give activated charcoal. Symptomatic and supportive therapy is usually all that is necessary. In severe poisoning, treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Cardiac arrhythmias, convulsions, and coma may result from the anticholinergic activity of belladonna alkaloids. Physostigmine salicylate is an antidote for severe intoxication from belladonna alkaloids and other anticholinergic drugs. Physostigmine salicylate dose in children: start with 0.5 mg; IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. Neostigmine is ineffective in reversing the effects of belladonna alkaloids on the central nervous system.

References

Dreisbach, R H: Handbook of Poisoning. Diagnosis and Treatment, ed. 8 Los Altos, California: Lange Medical Publishers, 1974

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index

Dalmane (Flurazepam Hydrochloride)

Type of Product: Hypnotic.

Manufacturer: Roche Laboratories, Division of Hoffman-LaRoche, Incorporated, Nutley, New Jersey 07110.

Ingredients/Description: A benzodiazepine similar to diazepam. Supplied in 15 and 30 mg capsules.

Toxicity: Oral LD_{50} in mice, 870 mg/kg; oral LD_{50} in rats, 1,232 mg/kg; oral LD_{50} in rabbits, 568 mg/kg.

This drug is rapidly absorbed from the gastrointestinal tract and rapidly metabolized. There is no excessive accumulation of the drug or its metabolities in any tissue.

Symptoms and Findings: Somnolence, confusion, and coma. Dizziness, drowsiness, lightheadedness, ataxia, central nervous system depression, lethargy, disorientation, and coma. Headache, nausea, vomiting, diarrhea, constipation, gastrointestinal

pain, talkativeness, apprehension, irritability, palpitations, chest pains, sweating, flushing, difficulty in focusing, blurred vision, hypotension, shortness of breath, dry mouth, bitter taste, excessive salivation, anorexia, euphoria. Elevated SGOT, SGPT, total and direct bilirubins, and alkaline phosphatase. Also possible paradoxical reactions such as excitement, stimulation, and hyperactivity.

Treatment: Lavage with charcoal slurry or induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary). Intravenous fluids should be administered and an adequate airway maintained. Respiration, pulse, and blood pressure should be monitored. Provide supportive care for hypotension and central nervous system depression. Do not use barbiturates in the event of excitation. The value of dialysis has not been determined.

Reference

Roche Laboratories, information from manufacturer.

Darvon Products

Type of Product: Analgesic medications.

Manufacturer: Eli Lilly and Company, P.O. Box 618, Indianapolis, Indiana 46206

Ingredients/Description: All products are capsules and contain the ingredients shown in Table 3.

Toxicity: Death has been reported in the following circumstances: not more than 1 gm in a 1-year-old child, 98 capsules (strength unspecified) in a 14-year-old girl; approximately 1.5 gm in a 19-year-old boy; approximately 650 mg in a 12-year-old child; and 1,280 mg in a 15-year-old girl. No human fatalities have been reported with phenaglycodol (contained in Darvotran); but coma, which lasted a few days, occurred after an ingestion of 15 gm of phenaglycodol. In animal studies, propoxyphene is apparently rapidly and extensively concentrated by the visceral and thoracic organs. Regardless of the route of administration, the concentration of free drug in the blood was uniformly low.

Symptoms and Findings: Nausea, vomiting, dizziness, hypotension, and central nervous system depression. Severe overdoses cause respiratory depression, coma, convulsions, and respiratory and cardiac arrest.

TABLE 3
CONTENTS OF DARVON PRODUCTS

Capsule	Propoxyphene	Aspirin	Phenacetin	Caffeine	Phenaglycodol
Darvon (pink)	32 or 65 mg	—	—	—	—
Darvon Compound (pink/gray)	32 mg	227 mg	162 mg	32.4 mg	—
Darvon Compound (red/gray)	65 mg	227 mg	162 mg	32.4 mg	—
Darvon with ASA (red/gray)	65 mg	325 mg	—	—	—
Darvontran (pink/maroon)	32 mg	325 mg	—	—	150 mg

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. After evacuation of the stomach, administer activated charcoal. Support respiration if breathing has stopped, or if its rate or depth has become too low to maintain effective ventilation. Naloxone hydrochloride (0.01 mg/kg, IV) is the specific antidote. If respiration improves after the first injection but it is not adequate, the dose should be repeated in 5 minutes and again in 10 minutes. If the injection produces no significant effect, the diagnosis of Darvon overdose may be in error.

Establish routine of close observation. This is important because the antidotal action of the narcotic antagonist is shorter than the respiratory depression that occurs from Darvon which may last from 24 to 48 hours. After successful initial resuscitation, further injections of the narcotic antagnist may be given intramuscularly. The intramuscular dose should be about 50% greater than the intravenous dose. Cardiac massage and intravenous or intracardiac epinephrine has been successful in treating cardiac arrest. Maintain blood pressure. Dialysis has not been effective. Exchange transfusion has been reported effective in two cases. All but one of the Darvon products contain aspirin. Therefore, salicylate intoxication may occur concurrently and require vigorous therapy (see Salicylates, page 82).

References

Emmerson, J L, Welles, J S, and Anderson, R C · Studies on the tissue distribution of d-Propoxyphene Toxicol Appl. Pharmacol, 11:482, 1967.

Swarts, C L. Propoxyphene (Darvon) poisoning A nearly fatal case with coma, convulsions, and severe respiratory depression, successfully treated with nalorphine Amer J Dis Child, 107·177, 1964.

d-CON Rat Poison

Type of Product: Rodenticide.

Manufacturer: d-CON Company, Incorporated, Subsidiary of Sterling Drug Incorporated, 90 Park Avenue, New York, New York 10016.

Ingredients/Description: d-CON Rat Poison contains warfarin 0.025%. Other rodenticides contain warfarin in concentrations as high as 0.5%. Other products of the d-CON Company do not contain warfarin, such as d-CON Ant Pruf which contains chlordane.

Toxicity: Estimated fatal dose for this product is 0.44 lb/kg in humans. This product causes no problem in children on single, acute ingestion. Repeated large ingestions may reduce clotting factors sufficiently to cause bleeding diathesis.

Symptoms and Findings: Onset of action is 24 to 36 hours after the first of several doses, with a duration of 1 to 2 days. Hemorrhagic phenomena. Back pain, abdominal pain, vomiting, nose bleed, prolonged prothrombin time. Skin lesions. Bleeding from skin, mucous membranes (gums), gastrointestinal tract, and genitourinary tract (blood in urine and feces).

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Vitamin K_1 emulsion 50 to 150 mg, IV, can be used if prothrombin time is abnormal. However, prothrombin time will not become abnormal unless repeated large ingestions occur.

References

Dreisbach, R. H.: Handbook of Poisoning: Diagnosis and Treatment, ed. 8. Los Altos, California: Lange Medical Publishers, 1974

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3 Baltimore: Williams and Wilkins, 1969.

DDT

Type of Product: Chlorinated hydrocarbon insecticide.

Manufacturer: Various.

Ingredients/Description: DDT is available as wettable powders of 25% to 75% concentrations; emulsified concentrated liquids of up to 50%; dusts of usually 10%. Most household sprays contained 5% solutions in kerosene. DDT is no longer on the market for commercial use.

Toxicity: A single ingestion of 10 mg/kg will produce symptoms in some subjects. Convulsions in humans are frequent with oral doses greater than 16 mg/kg. A dose of 20 gm in an adult produced severe symptoms lasting several weeks. Almost all fatalities have occurred from ingesting DDT in various solvents. With many household sprays of low DDT concentration, the kerosene solvent is responsible for most of the toxicity, i.e., hydrocarbon pneumonia.

Symptoms: Nausea, vomiting, perspiration, paresthesias, central nervous system stimulation, tremor, seizures, confusion, apprehension, irregular pulse. Death results from respiratory failure and/or ventricular arrhythmias.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) if convulsion is not imminent. Treat convulsion with diazepam (0.05 to 0.1 mg/kg. IV). Intravenous calcium gluconate has been recommended by some experts. Avoid fats or oils as lavage fluids or cathartics because they promote more rapid absorption of DDT. **Beware:** epinephrine is contraindicated because DDT (and other chlorinated hydrocarbons) sensitizes the heart to epinephrine, and it may produce fatal ventricular fibrillation. Ventricular fibrillation may respond to direct-current defibrillation and/or intravenous lidocaine (1 mg/kg as a loading dose).

For contact, remove DDT from skin with soap and water.

References

Hayes, W. J. Clinical Handbook on Economic Poisons: Emergency Information for Testing Poisoning. P.H.S. Publication 476, rev. Atlanta, Georgia: U.S. Communicable Disease Center, Toxicology Section, 1963.

National Clearinghouse for Poison Control Centers, Washington, D.C., card index file.

Demerol (Meperidine Hydrochloride)

Type of Product: Narcotic analgesic.

Manufacturer: Winthrop Laboratories, Division of Sterling Drug, Incorporated, 90 Park Avenue, New York, New York 10016.

Ingredients/Description: Available in tablets of 50 and 100 mg, elixir in bottles of 480 ml which contain 50 mg/5 ml; and vials and ampules for injection containing 25, 50, 75, and 100 mg/ml.

Toxicity: Considered extremely toxic if administered in excess of the recommended dose, which is 1.5 mg/kg/4 hours, IM. The oral form is less toxic.

Symptoms and Findings: *Central nervous system*—Euphoria, dysphoria, weakness, headache, agitation, tremor, uncoordinated muscle movements, trainsient hallucinations and disorientation, visual disturbances. Stupor, coma, respiratory depression. *Gastrointestinal*—Dry mouth, constipation, biliary tract spasm. *Cardiovascular*—Flushing of the face, tachycardia,

bradycardia, palpitation, syncope, circulatory collapse, cardiac arrest. *Genitourinary*—Urinary retention. *Pulmonary*—Respiratory depression and possible pulmonary edema. *Eyes*—Meperdine poisoning is not usually associated with pin-point pupils.

Treatment: Support respiration by the best means immediately available Naloxone hydrochloride (0.01 mg/kg, IV) is the antidote. If respiratory status improves after the first injection but is not yet adequate, the dose should be repeated in 5 minutes and again in 10 minutes. If the injection has no significant effect, the diagnosis of Demerol overdose may be in error. Establish routine of close observation. This is important because the antidotal action of the narcotic antagonists is shorter than the respiratory depression which is caused by Demerol and may be prolonged. After successful resuscitation, further injections of narcotic antagonists may be given intramuscularly. The intramuscular dose should be about 50% greater than the intravenous dose. Maintain adequate oxygenation and hydration. Although emptying the stomach is theoretically indicated, it should be performed only before respiration is compromised or after respiration is reestablished. Dialysis is not indicated.

Reference

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3. Baltimore: Williams and Wilkins, 1969

Detergent, Dishwasher

Type of Product: Strongly alkaline, phosphate-containing detergents required in automatic electric dishwashers.

Manufacturer: Various.

Ingredients/Description: Sodium carbonate, sodium metasilicate, sodium tripolyphosphate.

Toxicity: These products, designed for use in automatic dishwashers, are similar in composition to other household detergents, but they possess a high pH. Therefore, they are capable of causing corrosive mucous membrane lesions. Manufacturers constantly change formulations without changing the brand name, so assume the detergent is toxic until proven otherwise. However, recent formulations have been less caustic than previous ones.

Symptoms and Findings: Esophageal, gastric, and respiratory tract involvement. Caustic effects may produce pharyngeal and laryngeal edema with upper airway obstruction. Esophageal burns similar to lye burns may occur. Perforation of the stomach and peritonitis have been reported. Tetany may occur from ingestion of phosphates and a reduction in ionic calcium

Treatment: Treatment for ingestion should include immediate dilution with copious quantities of water or milk. Induction of emesis is contraindicated. Further treatment depends on the extent of tissue damage and the development of local or systemic manifestations (see Alkali, page 5). If hypocalcemia occurs give calcium gluconate (5 ml of 10% solution, IV) to restore ionic calcium.

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National Clearinghouse for Poison Control Centers, Washington, D.C., card-file index.

Diazinon

Type of Product: Organophosphate insecticide.

Manufacturer: Geigy Chemical Corporation, Yonkers, New York.

Ingredients/Description: Available in combinations of compounds and alone as both a household and commercial insecticide. Powders, miscible liquids, and oil are available with diazinon concentrations from 0.5 to 40%.

Toxicity: Oral LD_{50} for rats is 100 to 150 mg/kg. Inhibits cholinesterase; may produce symptoms through ingestion, percutaneous absorption, and inhalation.

Symptoms and Findings: The signs and symptoms may be classified according to three points of action of acetylcholine:

Parasympathetic Effects—Usually the first to appear. Include anorexia, nausea, sweating, epigastric and substernal tightness, heartburn, and tightness in the chest. More severe

exposures produce abdominal cramps, increased peristalsis, diarrhea, salivation, lacrimation, profuse sweating, pallor, and dyspnea. Involuntary defecation and urination, excessive bronchial secretions, bronchospasm, and pulmonary edema may occur in severe cases of poisoning.

Effects on Voluntary Muscles—These generally appear after parasympathetic effects have reached moderate severity and include muscle twitching, fasiculations, and cramps; these are followed by weakness, ataxia, [illegible]aralysis.

Central Nervous System Effects—Less common than the parasympathetic and muscular effects; may be entirely absent. They include tension, restlessness, and emotional lability. Greater exposure to organic phosphates produces headache, tremor, drowsiness, and confusion. Lethal or near lethal doses may produce convulsions, areflexia, and respiratory arrest.

Treatment: Atropine (0.5 to 1 mg, IV) as soon as possible. Repeat at 5- to 10-minute intervals until signs of atropinization appear. In severe antichloinesterase poisoning, 40 mg of atropine sulfate may be given in a day without producing symptoms attributable to atropine. Support respiration. Positive pressure oxygen may be necessary. Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with 5% sodium bicarbonate. Decontaminate skin with soap and water. Never give morphine, theophylline, or aminophylline. Observe patient constantly for 24 to 36 hours. Wear rubber gloves in removing clothes and washing the patient. Protopam chloride (PAM; 2-pyridine aldoxime methochloride), IV, is recommended as a supplement to atropine after cyanosis is overcome. PAM is an anticholinesterase reactivator. The manufacturer's dosage directions on the package should be followed. PAM has been used by some investigators up to a maximum total dose of 300 mg/kg in 48 hours. PAM is not a substitute for atropine (see *Clinical Handbook on Economic Poisons* for more details). There is no evidence that children require a larger dose of atropine sulfate (0.015 to 0.05 mg/kg) or paralidoxime chloride (Protopam, 15 mg/kg) than adults.

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National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Digitalis and Digitalis Glycosides

Type of Product: Cardiac stimulant.

Manufacturer: Various.

Ingredients/Description: Provided both as tablets and liquid.

Toxicity: The overlap between toxic and therapeutic doses of the digitalis glycosides is shown in the table of symptoms. Children tolerate relatively larger doses and higher plasma levels than adults. The single, lethal, oral dose of all the digital glycosides is probably 20 to 50 times the daily maintenance dose. The onset and duration of toxicity varies with the preparation, but half-life varies with the rapidity of loading and the plasma level.

Symptoms: Degrees of digitalis toxicity are given in Table 4.

Treatment:

1. Empty stomach with Ipecac Syrup (15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline.

2. Bind residual digitalis and that recirculated enterohepatically with a steroid binding resin; cholestyramine may be used. If not available, give 10 to 20 gm of activated charcoal, with possible adsorption of 0.25 mg digoxin by 2.0 gm of charcoal.

3. Monitor the ECG plus immediate and serial assay of serum potassium and electrolytes, blood gases, and renal function. Begin IV, and, if severe, central venous monitor.

4. Draw plasma for radioimmunoassay of the digoxin or digitoxin level.

Treatment of arrhythmias—See Table 5. Note: the value of potassium therapy has been overemphasized. Although potassium deficiency increases the binding of ouabain to the myocardium, the overwhelming inhibition of ATPase leads to a hyperkalemia. A slight increase in K^+ speeds atrioventricular conduction, but a greater elevation halves the amount of digitalis needed to produce atrioventricular block.

Treatment of hyperkalemia—See Table 6.

K^+ 5.0 to 6.0 IV, in 5% or 10% glucose plus sodium bicarbonate as needed.

K^+ 6.0 (despite IV, in glucose): insulin 0.2 U/kg plus glucose 200 to 400 mg/kg.

Sodium bicarbonate, 2 mEq/kg, IV.

Kayexalate retention enema (25% in 25% sorbitol) 1 gm/kg, every 4 to 6 hours.

K^+ 8.0 (despite vigorous therapy): hemodialysis or peritoneal dialysis may be indicated (but does not remove digitalis).

TABLE 4

SYMPTOMS

Clinical			
		Plasma Level (ng/ml)	
Grade	Symptoms	Digoxin	Digitoxin
Nontoxic	None	0.2–1.5	4–25
Slight	Anorexia, bradycardia, ectopic beats.	1.5–5	25–45
Moderate	Nausea, vomiting, headache, ventricular premature contractions.	5–15	35–55
Severe	Diarrhea, blurring of vision, somnolence, confusion, ventricular tachycardia, sinoatrial or atrioventricular block, hyperkalemia.	10–30	50–80
Extreme	Abdominal pain, convulsions, coma, high degree conduction blocks; atrial or ventricular fibrillation, severe hyperkalemia.	25–45	>60

TABLE 5

TREATMENT OF ARRHYTHMIAS

Therapy	Indication	Contraindication
Diphenylhydantoin (Dilantin), 75 mg/M², IV, every 5 minutes until ECG response or five doses (typical plasma level 4–20 mg/l) or 600 mg/M²/PO/day 1, then 300 mg/M²/PO/day 2.	Ventricular premature contractions (including bigeminy, trigeminy, quadrigeminy) ventricular tachycardia; atrial tachycardia with block.	Little value in atrioventricular junctional tachycardia.
Potassium (caution), 0.2–0.6 mEq/min/M², IV; requires 120–160 mEq K/liter in 5% glucose or saline until serum K = 4.0.	Ventricular tachycardia or atrial tachycardia with block only if serum K^+ <4.0 (dangerous if serum K^+ normal or elevated.	Atrioventricular block associated with atrial rate <100, unless serum K^+ <3.0. Sinoatrial or ventricular delay in conduction.

TABLE 6

TREATMENT OF HYPERKALEMIA

Therapy	Indication	Contraindication
Atropine, 0.01 mg/kg, IV or SC every 4 hours.	Atrioventricular or sinoatrial block, sinus bradycardia, atrial fibrillation with bradycardia.	Ventricular premature contractions or ventricular tachycardia.
Procainamide, 5 mg/kg, IM, every 4–6 hours.	Ventricular premature contractions or ventricular tachycardia unresponsive to potassium.	Sinoatrial or atrioventricular block.
Transvenous pacemaker ventricular.	Bradycardia. Unresponsive to atropine; during drug treatment of ventricular arrhythmia.	Sinoatrial or atrioventricular block.

References

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Dilantin

[Phenytoin (USP), Diphenylhydantoin Sodium (USP, old)]

Type of Product: Anticonvulsant.

Manufacturer: Parke, Davis and Company, Detroit, Michigan 48232.

Ingredients/Description: The following products are those of the Parke, Davis and Company; other manufacturers' products may have different dosage forms. Suspension, phenytoin—30 mg/teaspoon (pink); 120 mg/teaspoon (orange). Tablets, phenytoin—50 mg (triangular). Capsules, phenytoin—30 mg (pink band); phenytoin—100 mg (orange band); phenytoin—100 mg, phenobarbital—30 mg (black band); phenytoin—100 mg, phenobarbital—15 mg (purple band).

Toxicity: Acute intoxication infrequently leads to death or life-threatening situations. No sign or laboratory value predicts outcome; therefore, all patients must be under observation until clear signs of improvement are evident. One reported death in a 4½-year-old child followed ingestion of 2 gm; adults making suicide attempts have survived doses approximately 10 times this dose on a milligram per kilogram basis. Death is preceded by deepening coma and, terminally, vascular collapse.

Symptoms and Findings: Ataxia and drowsiness usually bring the child to adult attention. Adults may complain of vertigo and diplopia. Intense midepigastric pain mimicking ulcer may be present. Nystagmus, dilatation of the pupils, and hyper-

active reflexes are usually present, although the reflexes may be normal. Reflexes may be absent when coma occurs. Somnolence and depression are usual, but, agitation or swings between depression and agitation may occur. Blood pressure is normal except terminally. Cardiac arrhythmias may be present. Hyperglycemia and ketoacidosis have been reported; urine and serum from all patients should be analyzed for glucose.

The course may be prolonged with gradual improvement over days to weeks, or there may be complete recovery in 2 to 4 days. Slow intestinal absorption has been reported after acute intoxication but is more frequent in chronic overdose.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary); give activated charcoal.

Judicious use of insulin may be required in hyperglycemia. Maintain hydration, but diuresis has no value. If central nervous system depression increases, peritoneal lavage should be instituted, although most patients will not require this. A relatively small amount of phenytoin is recovered, but the clinical benefit may be dramatic. Hemodialysis should be considered in massive (>200 mg/kg) overdose. If the phenytoin preparation includes phenobarbital, (see Barbiturates, page 11.)

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Treasure, T. and Toseland, P A: Hyperglycemia due to phenytoin toxicity Arch Dis Child, 46 563, 1971.

Diphenhydramine Hydrochloride (Benadryl)

Type of Product: Antihistamine.

Manufacturer: Parke, Davis and Company, Detroit, Michigan 48232, and Searle Laboratories, Division of G.D. Searle and Company, Box 5110, Chicago, Illinois 60680.

Ingredients/Description: Benadryl Elixir (red), 12.5 mg in each 5 cc.

Benadryl 25 mg capsules (No. 5 hard capsule with pink top).

Benadryl 50 mg Kapseals (No. 4 hard, pink capsule with white band).

Benadryl 50 mg Emplets (tablet).

Ambenyl Expectorant (56 mg Benadryl per ounce).

Benylin Expectorant (80 mg Benadryl per ounce).

Hydryllin Compound (8 mg diphenhydramine per 4 cc).

Toxicity: Toxic dose is 25 to 50 mg/kg. Fatal results have been reported in two 2-year-old children; one from a 2 oz ingestion (150 mg) and the other from an ingestion of 474 mg. A nonfatal poisoning in a 3-year-old child was reported with an ingestion of 700 to 800 mg.

Symptoms and Findings: The action of Benadryl is a combination of both antihistaminic and atropine-like effects. In children, central nervous system stimulation and atropine-like toxicity signs with fixed, dilated pupils are likely to be encountered. In adults, central nervous system depression is more common. The convulsions of intermittent tonic-clonic type—sometimes heralded by muscular tremors and athetosis—may be difficult to control. Diffuse central nervous system stimulation may also produce hallucinations, excitement, and ataxia. Fixed, dilated pupils and hyperthermia are not uncommon. Absorption from the gastrointestinal tract is complete within 2 to 4 hours. Death from accidental overdosage occurs in 2 to 18 hours, after deepening coma and cardiorespiratory failure. Renal and hepatic failure have been reported late in the course of illness.

Treament:

1. Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage (unless convulsions are imminent). Emesis is usually successful in spite of antiemetic effects of the antihistamines.

2. Control convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Maintain respiration.

3. Physostigmine salicylate is an antidote for the anticholinergic (atropine-like) actions of Benadryl and other antihistamines. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses

over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. Neostigmine is ineffective in reversing the effects of Benadryl on the central nervous system.

4. Treat hyperpyrexia with tepid water sponging.
5. Exchange transfusion should be considered if extremely high doses have been ingested. Peritoneal dialysis is not useful.

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Wyngaarden, J. B., and Seevers, M. H. The toxic effects of antihistamine drugs. J.A.M.A., 145:277, 1951

Donnatal Products

Type of Product: Antispasmodic.

Manufacturer: A. H. Robins Company, Richmond, Virginia 23220.

Ingredients/Description: See Table 7. The belladonna alkaloid content per unit listed in tablets, elixir, capsules, and #2 is equivalent to 0.24 mg of atropine. The atropine equivalent of one Extentab is 0.72 mg.

Toxicity: The estimated fatal adult dose of atropine is 100 mg, but adult patients have survived this dose in isolated instances. The estimated lethal dose for children is 10 mg. Phenobarbital is potentially fatal for adults at a dose of 5 mg.

Symptoms and Findings: Atropine overdose can cause dilated pupils; dry mouth (thirst, difficulty in swallowing); hyperthermia; flushed, hot, dry skin; headache, nausea, delirium; convulsions, rapid pulse and respiration; and urinary retention. Barbiturates may produce severe central nervous system depression, possibly progressing to coma with respiratory and circulatory failure (see Barbiturates and Atropine, pages 11 and 9).

Treatment: Initial therapy in the conscious patient is emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary). Adequate facilities for respiratory support are essential, and blood pressure maintenance may require administration of intravenous fluids. Peritoneal dialysis or hemodialysis are indicated in severe barbiturate overdose. Symptomatic improvement of atropine effects may be achieved with physostigmine salicylate. Physostigmine salicylate is an antidote for severe intoxication from atropine and other anticholinergic drugs. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. Neostigmine is ineffective in reversing the effects of atropine on the central nervous system. (See Barbiturates, page 11, and Atropine, page 9.)

TABLE 7

INGREDIENTS, DONNATAL PRODUCTS

Ingredient	Tablets, Capsules, Elixir*	Donnatal #2	Extentabs
Hyoscyamine SO_4	0.1 mg	0.1 mg	0.3 mg
Atropine SO_4	0.02 mg	0.02 mg	0.06 mg
Hyoscine HBr	0.007 mg	0.007 mg	0.02 mg
Phenobarbital	16.20 mg	32.4 mg	48.6 mg

* Elixir only, 23% ethanol.

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Doriden (Glutethimide)

Type of Product: Nonbarbiturate sedative.

Manufacturer: USV Pharmaceutical Corporation, 1 Scarsdale Road, Tuckahoe, New York 10707.

Ingredients/Description: Glutethimide is supplied as tablets, 125, 250, and 500 mg; capsules, 500 mg.

Toxicity: Ingestions of 5 gm by adults leads to serious complications, and ingestions of more than 10 gm or 0.15 gm/kg have been associated with a significant mortality rate.

Symptoms and Findings: Central nervous system depression, often with fluctuations in consciousness but progressing to profound coma with fixed, dilated pupils and papilledema; hypotension that may be unresponsive to volume expansion but possibly improved by large doses of steroids; sudden apnea without gradual respiratory depression; hypothermia sometimes followed by hyperpyrexia. In children, there may be fever, dry mucous membranes, flushing, and ataxia that may mimic atropine poisoning.

Treatment: If patient is alert, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary). Perform gastric lavage (if in coma) with 5% sodium bicarbonate (favors hydrolysis and inhibits absorption because glutethimide has a pKa of 9.0) followed by 20 gm of activated charcoal. Maintain body temperature. Ventilatory monitoring and support. Expand or maintain extracellular fluid with isotonic saline, 400 to 800 ml/M^2, followed by maintenance fluids, 2,000 ml/M^2/day. Forced diuresis is of no value. Hemodialysis is indicated if the blood level is >3 mg/100 ml, history of ingestion of more than 10 gm or 0.15 gm/kg, patient in profound coma or manifesting pulmonary edema, cerebral edema, or fixed, dilated pupils. The rapid binding of glutethimide to cerebral lipid accounts for the somewhat low efficacy of hemodialysis, but it is beneficial in severe poisonings. Aqueous dialysis is currently considered equal to lipid dialysis.

Reference

Knepshield, J. H., Schreiner, G. E., Lowenthal, D. T., and Gelfand, M. C: Dialysis of poisons and drugs—anuual review. Trans. Amer. Soc. Artif. Intern. Organs, 19.590, 1973.

Drano Granules

Type of Product: Toilet bowl and drain cleaner.

Manufacturer: The Drackett Company, Division of Bristol Myers, Cincinnati, Ohio 45232.

Ingredients/Description: Caustic soda (sodium hydroxide), 54.2%; sodium nitrate, 30.0%; aluminum, 4.1%; inert ingredients, 11.3%.

Toxicity: This product is a strong alkali.

Symptoms and Findings: Caustic burns to skin, eyes, and mucous membranes. Nitrates may cause methemoglobinemia in infants. Death from shock, asphyxia from glottic edema, or perforation of esophagus or stomach, and eventually esophageal stricture.

Treatment: Do not induce emesis or perform gastric lavage. Neutralize (milk) and dilute (large amounts of water). Tracheostomy is indicated for obstruction from laryngeal edema. Maintain circulation (fluids, plasma, drugs). Surgery for perforation. Many authorities believe the esophagus should be put at rest until the acute inflammatory process subsides (3 or 4 days); therefore, parenteral fluids should be administered. However, some authorities would institute a liquid diet if tolerated. Cortisone given within the first 24 to 48 hours after the poisoning has shown a suppressive effect on inflammatory response of injured tissue in experimental animals. As a result of this work, cortisone has been used in humans after the ingestion of lye. Cortisone is administered within the first 24 to 48 hours (Prednisone, 1 to 2 mg/kg) and is given daily over a 2-week period. Although results with cortisone (or its equivalent) are suggestive of a decreased incidence of stricture formation, results are not definitive but need further investigation. The timing of esophagoscopy for determining the extent of corrosive damage is controversial; some believe that it should be done within the first 24 hours, and others feel that a delay of 48 to 72 hours may allow the edema to subside so a more thorough examination is possible. The degree of stricture formation may be followed with serial esophagograms. Antibiotics should be given because of danger of secondary infections. External burns should be washed with large volumes of water.

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National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Elavil (Amitriptyline Hydrochloride)

Type of Product: Antidepressant; antineurotic.

Manufacturer: Merck Sharp & Dohme, Division of Merck and Company, Incorporated, West Point, Pennsylvania 19486.

Ingredients/Description: Amitriptyline hydrochloride is provided in film-coated tablets in 10 mg (blue), 25 mg (yellow), and 50 mg (beige); and in solution for injection 10 mg/ml.

Toxicity: Serious toxicity can be caused by 20 mg/kg, and lower doses may also cause severe reactions. Survival has followed ingestion of 1,000 mg amitriptyline ingested with 80 mg perphenazine; death followed ingestion of 875 to 1,000 mg and 1,250 mg, respectively, in 15- and 18-month-old children, and 20 to 25 mg/kg in an 18-month-old child.

Symptoms and Findings: The most serious symptoms come soon after ingestion, often within 1½ to 3 hours. Survival to 12 to 24 hours usually is associated with the abatement of all symptoms, although ECG signs indicative of conduction defects may last for several days.

Cardiac, central nervous system, and electrolyte effects are the most important. Palpitations and tachycardia may be followed by arrhythmias, cardiac failure, and hypertension; later, hypotension, ventricular tachycardia, and fibrillation may occur. Central nervous system findings may include dizziness, hallucinations, sedation, agitation, seizures, and coma. Hypokalemia and metabolic acidosis may occur. Atropine-like actions include dry mouth, blurred vision, urinary retention, and constipation. ECG findings include supraventricular tachycardia at lower doses, and widening of the QRS, depression of the S-T segment, and abnormal T waves, which may persist beyond other signs and symptoms. Ventricular tachycardia, flutter and fibrillation, wandering pacemaker, multifocal extrasystoles, and atrioventricular and intraventricular blocks are found in severe and potentially lethal poisoning.

Treatment: If the patient is not convulsing and has normal blood pressure and ECG, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) and administer activated charcoal. All patients should be observed in the hospital with frequent ECG monitoring. Seizures may be controlled with diazepam (0.05 to 0.1 mg/kg, IV). Phenytoin may be helpful for both seizures and arrhythmias in a dose of 5 mg/kg given intravenously at a rate not to exceed 0.5 mg/kg/minute. Defibrillator should be available, although results in ventricular tachycardia and flutter have not always been satisfactory. Slow intravenous propranolol (Inderal, 0.05 to 0.1 mg/kg/dose) has been used successfully. Parasympathomimetic drugs have been effective in some arrhythmias.

Physostigmine salicylate is an antidote for severe intoxication from drugs with anticholinergic action such as amitriptyline. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. Although neostigmine methylsulfate is not effective in reversing the central nervous system toxic manifestations of the tricyclic antidepressants, it may be effective in controlling the cardiac arrhythmia. The dose of neostigmine is similar to that of physostigmine salicylate. Isoproterenol and levarterenol should be avoided. Blood and plasma expanders may be necessary. Respirations may require mechanical support. Dialysis and diuresis appear to offer little benefit. Continuous gastric lavage may be useful but should be performed in the older comatose patient only after insertion of a cuffed endotracheal tube. Electrolytes should be monitored; acidosis should be treated with $NaHCO_3$, and hypokalemia should be treated with potassium. Sudden relapse may occur after successful therapy, so vigilance for 24 or more hours is indicated.

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Ethyl Alcohol

Type of Product: Beverages; solvent for perfumes and colognes.

Manufacturer: Various.

Ingredients/Description: Whiskey contains 43 to 50% alcohol. Wines contain 4 to 6% alcohol. Beer contains 3 to 5% alcohol. Colognes are variable in content (see Colognes, page 21).

Toxicity: Ethyl alcohol has an estimated fatal oral dose of 250 to 500 gm (500 to 1,000 ml of whiskey). A blood concentration between 0.3 and 0.4% is commonly associated with stupor or coma, and 0.5% is often fatal. Aspiration tests were performed on rats: 0.1 ml of Scotch whiskey caused lung damage; and, aspiration of 0.1 ml of 100% ethyl alcohol produced rales, dyspnea, and edema but no hemorrhage.

Symptoms and Findings: Exhiliration. Gross incoordination, inarticulateness, vertigo, ataxia, nausea, and vomiting with risk of asphyxia. Severe vomiting may lead to dehydration and acidosis. Drowsiness, stupor, flushed face, sweating, hypothermia, tachycardia. Variable pupilary reaction. Hypotension, coma, shock. Hypoglycemia and convulsions occur in young children. Death is caused by respiratory or circulatory collapse.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with sodium bicarbonate (3 to 5% solution) or normal saline. Maintain respiration. Avoid narcotics, barbiturates, or depressant emetics such as apomorphine. Coma, shock, hypoglycemia, dehydration, or acidosis should be treated with conventional supportive measures. Frequent blood sugar determinations are indicated. In severely intoxicated patients, hemo- or peritoneal dialysis should be considered.

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Ethylene Glycol

Type of Product: Main ingredient used in permanent-type antifreeze.

Manufacturer: Various.

Ingredients/Description: Colorless liquid with faint odor.

Toxicity: Poisoning almost always is the result of ingestion of antifreeze. Death in adults has been reported from the ingestion of 100 ml. Intoxication from inhalation or skin absorption is possible but rare.

Symptoms and Findings: Central nervous system effects are the first signs of ethylene glycol poisoning and may include transient exhilaration, motor incoordination, varying degrees of depression, and convulsions. Nausea and vomiting may occur. Cardiopulmonary effects with tachypnea, cyanosis, and pulmonary edema may occur. Death may occur from respiratory paralysis. Renal effects occur usually beyond the second or third day of intoxication: flank pain and tenderness, acute renal failure with oliguria or anuria, and uremia. Urine may show calcium oxalate crystals, albumin, red blood cells, and casts. Hyperkalemia, acidosis, and death may occur with uremia.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Support respiration. If manifestations of hypocalcemia occur, give 10 ml of a 10% calcium gluconate solution, intravenously, slowly. In oliguric or anuric patients, fluids and electrolytes must be restricted to cover daily requirements and any fluids and electrolytes lost from the previous day (vomiting, urine, and so forth). The serial determination of blood electrolytes is essential in the management of acute renal failure. Consider using hemodialysis or intermittent peritoneal lavage in patients with prolonged renal failure, hyperkalemia, intractable acidosis, or a deteriorating clinical condition. Early administration of ethanol to patients who have ingested ethylene glycol may prevent its lethal effects by inhibiting oxidation and allowing the unchanged compound to be excreted. The lethal effects of ethylene glycol in rats and monkeys can be sharply reduced by subsequent administration of ethanol. Protection appears to depend on competitive inhibition of the enzymatic oxidation of ethylene glycol; thus preventing the formation of metabolic products more toxic than the compound itself. Doses of pure ethanol of 10 gm/hour for a 70 kg adult will

suppress oxidation of ethylene glycol. This must be diluted down to a 5% solution of ethanol in multiple electrolyte solutions for intravenous use or can be given as a 25% solution orally. Proportionately smaller doses may be considered for children. Therapy with ethanol should be continued for 2-5 days or until urine is free from calcium oxalate crystals. Blood ethanol levels should be monitored. Diuretics may be valuable. Therapy for renal failure may be necessary for many days.

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Etrafon

Type of Product: Tranquilizer-antidepressant combination product.

Manufacturer: *Etrafon*—Schering Corporation, Galloping Hill Road, Kenilworth, New Jersey 07033. *Triavil*—Merck, Sharp and Dohme, Division of Merck and Company, Inc., West Point, Pennsylvania 19486.

Ingredients/Description: NOTE: Triavil is a comparable product. See Table 8 for ingredients.

Toxicity: Serious toxicity is usually related to the amitriptyline content, and 20 mg/kg may be expected to cause seizures, arrhythmia, or both. Forty tablets of Etrafon Forte has proven lethal.

Symptoms and Findings: May be any of those occurring with either drug alone. For discussion and treatment see Elavil (page 42) and Phenothiazine Tranquilizers (page 77). Early treatment should be directed to the amitriptyline effects because they produce the most threatening symptoms.

Treatment: See Elavil (page 42) and Phenothiazine Tranquilizers (page 77).

References

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TABLE 8
ETRAFON-TRIAVIL INGREDIENTS

Ingredient	Etrafon 2–10 Triavil 2–10	Etrafon Triavil 2–25	Etrafon–A Triavil 4–10	Etrafon Forte Triavil 4–25
Amitriptyline	10 mg	25 mg	10 mg	25 mg
Perphenazine	2 mg	2 mg	4 mg	4 mg

Hydrogen Peroxide

Type of Product: Oxidizing agent.

Manufacturer: Various.

Ingredients/Description: Hydrogen Peroxide is an oxidizing liquid marketed as aqueous solutions ranging from the common concentration of 3% as a topical antiseptic, 6% in hair preparations (bleaches, neutralizers, and so forth), to 30% for industrial and laboratory use, and 90% for use in rocket propulsion.

Toxicity: No primary systemic effects when ingested because it is decomposed to oxygen in the bowel before absorption.

Symptoms and Findings: Decomposition of hydrogen peroxide may release large volumes of oxygen (10 times the volume for a 3% solution). Rupture of the colon, proctitis, and ulcerative colitis have been reported following hydrogen peroxide enemas. Dropping a 3% solution on the eye 3 to 5 times a day has been reported to be innocuous. High concentration hydrogen peroxide is generally feared as a potential cause of severe corneal damage. Ingestion of the commonly available household products, (3 to 6%) should cause no problem other than possible mucous membrane and gastrointestinal irritation. Higher concentrations (such as 30%) are considered corrosive.

Treatment: Dilute with milk or water. For eyes, flush thoroughly with water. Corrosive damage may occur with the highly concentrated products. Symptomatic and supportive treatment otherwise.

References

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3. Baltimore: Williams and Wilkins, 1969.

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Iron Salts

Type of Product: Medicinal preparation for anemia.

Manufacturer: Various.

Ingredients/Description: Medicinal iron is virtually always the cause of acute poisoning in children. Iron salts are dispensed in liquid and solid forms, frequently with other ingredients such as vitamins Calculation of toxic dose is done on the basis of elemental iron content. Iron salts supply elemental iron in the amounts shown in Table 9. For example, 5 gm ferrous sulfate supplies 1 gm elemental iron.

Toxicity: The reported average lethal dose is 180 mg elemental iron per kilogram (0.9 gm ferrous sulfate per kilogram). However, the minimum lethal dose is as little as 600 mg elemental iron (3 gm ferrous sulfate). Total doses of 200 to 400 mg have caused severe symptoms in young children. Ferrous and ferric salts may also cause corrosive damage to the stomach and small intestines.

Symptoms and Findings: Acute iron poisoning in children characteristically follows a biphasic course. Usually a portion of the tablets (or liquid) ingested is vomited within one-half hour. Vomitus may be bloody, contain partially digested tablets, and recur for up to several hours. Retained tablets may be visible by x-ray. Enteric-coated tablets may pass into the small intestine without inducing severe vomiting. During the first 6 to 12 hours, painless, bloody diarrhea or tarry stools, lethargy, and—in severe cases—acidosis, and shock may occur. Leukocytosis and fever may also be present. The child may appear to improve clinically after this first symptomatic phase, only to lapse unexpectedly into profound cardiovascular collapse some hours later. This second phase is associated with early hepatic injury and is refractory to treatment. Latent periods between these two symptomatic phases may last from a few to 48 hours. The course is difficult to predict, but the second stage is not seen in milder cases. Instances of cirrhosis and pyloric and duodenal stenosis, which become evident after several weeks or months, have been reported.

Treatment: In all instances of iron-containing compounds, induce emesis (Ipecac Syrup, 15 ml, PO, with 1 cup of milk or water; repeat in 20 minutes if necessary). If estimated dose approximates 200 mg, and for all large ingestions where frank hematemesis is not a problem, perform gastric lavage with a 5% sodium bicarbonate solution or a 5% sodium dihydrogen phosphate solution (readily prepared by diluting Fleet

Brand Enema 1:1 with water). Occasionally a gastrotomy may be indicated to remove a large bolus of enteric-coated ferrous sulfate tablets lodged in the prepyloric area that cannot be removed by repeated gastric lavage.

With symptoms, however mild, hospitalize. Abdominal x-ray may reveal the number of tablets not removed by emesis and lavage, and attempts should be made to remove them by catharsis (Na_2SO_4 0.5 gm/kg, PO).

If shock or coma present, begin vigorous use of fluids, blood, and/or plasma. Institute parenteral deferoxamine at a rate of 15 mg/kg/hour, IV (excessive rate of infusion leads to hypotension).

In asymptomatic patients with a history of the ingestion of more than 200 to 400 mg of elemental iron and in mildly symptomatic patients, the determination of serum iron may be of benefit if performed within 6 hours of ingestion. If serum iron is less than 300 μg/100 ml, systemic toxicity is unlikely, and, supportive care with demulcents, antacids, and a bland diet for the gastrointestinal tract is usually sufficient. If serum iron is more than 300 μg/100 ml, systemic toxicity is more likely. In this situation, and when there is uncertainty of the amount ingested or absorbed, it is sometimes advisable to give a single test dose of deferoxamine (20 mg/kg, IM), which is the specific chelating agent for iron. If the urine turns salmon-colored, ferrioxamine is present, and a potentially toxic amount of iron may have been absorbed. Further administration of deferoxamine is indicated. The sooner it is started, the more effective it is. Starting deferoxamine after 12 to 18 hours may be of little value. One or two doses (20 to 40 mg/kg, IM) at 6-hour intervals are usually sufficient. Give a third dose only if urine is still salmon-colored 6 hours after the second dose. Use higher dose in severe cases.

TABLE 9

ELEMENTAL IRON IN IRON SALTS

Iron Salt	Amount
Ferrous sulfate	20%
Ferrous fumarate	33%
Ferrous cholinate	13%
Ferrous gluconate	11.5%

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Isoniazid

(Isonicotinic Acid Hydrazide, INH, Nydrazid, Noconyl)

Type of Product: Antituberculosis drug.

Manufacturer: Various.

Ingredients/Description: Isoniazid is used in the treatment of tuberculosis and is supplied in 25, 50, or 100 mg tablets, 10 mg/ml syrup, and 10 or 100 mg/ml intramuscular injection. It is an inhibitor of monoamine oxidase and potentiates the toxic effects of alcohol and barbiturates. It is rapidly absorbed from the gastrointestinal tract with maximum blood levels achieved in 1 to 3 hours after ingestion, and peak excretion in 2 to 4 hours Within 24 hours, more than 80% of an ingested dose appears in the urine, mainly as the acetyl derivative, and more than 10% appears in the bile.

Toxicity: Deaths have occurred in children from ingestion of as little as 80 mg/kg (8.3 gm by a 2½ year old; 3 gm by a 13 year old). Adults have survived oral doses of 12.5 gm without, and 20 gm with, hemodialysis. Toxic symptoms have been caused by 1 to 2 gm in young children.

Symptoms and Findings: The predominant symptoms of isoniazid intoxication are tachycardia, periorbital myoclonus, muscular twitching, and generalized tonic and clonic convulsions. Exaggerated reflexes, tinnitus, vertigo, weakness, vomiting, constipation, electrolyte imbalance (hyperkalemia, metabolic acidosis), hyperglycemia, acetonuria, sudden drop in blood pressure, stupor, and psychosis have been reported. Patients with severe intoxication exhibit coma, convulsions, apnea, cyanosis, and arrhythmia; death results from respiratory arrest or circulatory failure. Transient paresthesias and peripheral neuritis or liver damage may occur; deafness and optic neuritis with atrophy and blindness have been reported.

Treatment: Because of the rapid onset of symptoms—which may begin within 30 minutes after ingestion—induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) if it is possible to do so prior to the onset of central nervous system stimulation. Gastric lavage with normal saline or Ringer's lactate within the first 2 to 3 hours is advised, but should not be attempted until convulsions are under control. If comatose, consider endotracheal intubation and need for assisting respiration. Give intravenous sodium bicarbonate in amounts necessary to correct the metabolic acidosis. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). In addition, pyridoxine hydrochloride (200 mg, IV) may be given as it is an incomplete antagonist to the metabolic action of isoniazid. Pyridoxine may be beneficial in the control of convulsions and peripheral neuritis. Hemodialysis, peritoneal dialysis, and exchange transfusion all have been used successfully in treating patients who ingested potentially lethal doses. Isoniazid blood levels drop at twice their normal rate during hemodialysis. Osmotic diuresis (mannitol, 2 to 4 gm/kg/24 hours) also hastens excretion.

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Isopropyl Alcohol

Type of Product: Rubbing alcohol.

Manufacturer: Various.

Ingredients/Description: A clear, colorless liquid found principally as a rubbing compound. Usually sold in pint bottles. Also used as solvent in some skin lotions and medications.

Toxicity: Probable lethal dose is 2 to 4 oz in children. Isopropyl alcohol is approximately twice as toxic as ethyl alcohol. Toxicity may occur from inhalation of high concentrations of isopropyl alcohol Deep coma has resulted from sponging a febrile child with a concentrated isopropyl alcohol solution.

Symptoms and Findings: Central nervous system depression, dizziness, headache, incoordination, stupor, and coma. More irritating to the gastrointestinal tract than ethyl alcohol. Likely

to produce gastroenteritis, vomiting, hematemesis, and diarrhea Bradycardia, hypotension, and sometimes circulatory collapse occur. The secretion of isopropyl alcohol by the salivary glands and gastric mucosa tends to prolong the action of the alcohol. Symptoms persist two to four times as long as with ethyl alcohol ingestion Acetonuria, ketosis, and anuria may occur. Pulmonary damage and edema may occur as a result of pulmonary excretion of the alcohol. Hypoglycemia occurs, particularly in small children.

Treatment: Usually required only if more than 5 ml is ingested. Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with sodium bicarbonate (3 to 5% solution) or normal saline Maintain respiration. Avoid narcotics, barbiturates, or depressant emetics such as apomorphine Coma, shock, hypoglycemia, dehydration, or acidosis should be treated with conventional supportive measures. Frequent blood sugar determinations are indicated in severely intoxicated patients, and hemo- or peritioneal dialysis should be considered.

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Kerosene and Related Petroleum Distillates

Type of Product: Solvents, fuels, cleaning agents, polishes.

Manufacturer: Various.

Ingredients/Description (in order of decreasing volatility): Petroleum ether (Benzine), rubber solvents, lacquer diluents, gasoline, petroleum naptha, petroleum spirits, paint thinners, fuel oils, kerosene, lubricating oil, mineral seal oil.

Toxicity: The majority of deaths following ingestion of these products are the result of pulmonary effects. Chemical pneumonia can result from aspiration of as little as a few milliliters Much larger amounts can be tolerated by ingestion if it is not aspirated Systemic absorption of these substances may produce central nervous system, cardiac, and renal effects.

Symptoms and Findings: Ingestions produce a burning sensation and irritation of mouth, esophagus, and stomach, with vomiting. Either inhalation or ingestion may cause euphoria, burning sensation of chest and mucous membranes, headache, tinnitus, vertigo, nausea, restlessness, weakness, visual disturbances, incoordination, confusion, central nervous system depression with or without convulsions, peripheral cyanosis, and death from respiratory arrest. Chemical pneumonia is indicated by cough, fever, rapid breathing, cyanosis, tachycardia, and pulmonary edema However, chest x-ray is the best diagnostic tool for pneumonitis Secondary bacterial infection, albuminuria, hepatosplenomegaly, and cardiac dilatation, flutter, and failure may also occur.

Treatment: Any patient who has ingested only a "taste" or a few milliliters should not have emesis induced and no gastric lavage. Whether or not to empty the stomach following known ingestion of unusually large amounts of these products remains controversial. If unusually large amounts of kerosene have been ingested or the kerosene contains a more toxic substance, the best method of removal (in an alert patient) is emesis in the upright position (Ipecac Syrup, 15 ml, PO, with 1 cup of water, repeat in 20 minutes if necessary). Do not induce emesis in a comatose patient or one who has already vomited This recommendation is made on the basis of newer information which shows the safety of Ipecac Syrup-induced emesis following hydrocarbon ingestion. Some physicians may prefer to continue to follow a formerly recommended practice of lavage rather than emesis.

Gastric lavage should be used for unusual circumstances, including comatose patients, particularly when a more toxic poison is dissolved in the solvent. During this procedure, a snug-fitting endotracheal tube should be inserted; but, the latter is a hazardous procedure in young children unless performed by someone who is an expert in the technique.

Antibiotics do not change the course of chemical pneumonitis. Unless the patient is in shock, adrenocorticosteroids are of no value. Epinephrine and norepinephrine are contraindicated because they may precipitate cardiac arrhythmias.

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Lead

Type of Product: Paint, lead objects; tetraethyl lead gasoline additive, dust from smelters, and auto exhaust.

Manufacturer: *Various.*.

Ingredients/Description: *Introduction*—Lead poisoning results most commonly from repetitive absorption from the gastrointestinal tract of increased amounts of lead. Acute poisoning from a single, massive, oral dose of lead salts is exceptionally rare The chronic course of poisoning may be punctuated by acute symptomatic episodes. Metallic lead objects (e.g., fishing sinkers, toy soldiers, costume jewelry), if retained in the stomach, will dissolve and release lead slowly so acute symptoms of poisoning may begin after 1 to 2 months. Tetraethyl lead poisoning is limited to industrial exposures. Lead in automotive exhausts is in an inorganic form. The concentrations of lead in air, except in unusual industrial circumstances, is insufficient to produce clinical poisoning. Illicit whiskey can contain enough lead to cause lead poisoning.

Overexposure to Lead Varies with Age—In the young child, increased lead absorption results most commonly from repetitive ingestion of old paint, old putty, and lead-contaminated dirt and dust. Symptomatic episodes are most common during summer, and are generally found in children with pica. In older children and adolescents in whom pica—except in retarded children—can be excluded, alternate sources should be checked (i.e., lead objects retained in the stomach, making toy soldiers, illicit whiskey, part-time jobs in battery and other lead manufacturing plants, home repair involving burning and scraping of old painted surfaces). If all ages in a household are involved, suspect a common source (i.e., use of improperly lead-glazed pottery cups, pitchers for fruit juice and other beverages, burning of battery casings, drinking water collected and stored in lead-lined cisterns).

Toxicity: Actu[illegible]e of lead absorbed is rarely known. Degree of toxicity, [illegible] of acute symptoms, and need for chelation

therapy can be estimated on the basis of certain laboratory tests. Ranges in whole-blood lead concentration (μg Pb per 100 gm whole blood) provide an index of current absorption as well as an index of relative risk of symptoms: <30 μg Pb (normal), 30 to 49 μg Pb (some increase in absorption and environmental exposure, no risk of symptoms); 50 to 79 μg Pb (increased absorption, subclinical toxicity if metabolic tests also abnormal, mild symptoms uncommon but may be present): ≥80 μg Pb (if confirmed, greatly increased absorption, severe symptoms may occur, metabolic tests are abnormal, chelation therapy is indicated even if symptoms are absent). Long bone x-rays positive for lead lines in association with >50 to 60 μg Pb indicate prolonged increased intake and the need for intervention. Routine blood tests may show findings characteristic of iron-deficiency anemia. Special tests for poisoning: delta-amino-levulinic dehydratase (ALA-D) assay, less than 15% of normal for method or erythrocyte protoporphyrin (EP) more than 10 times greater than normal (>500 μg/100 ml red blood cells) indicate metabolic toxicity and the need for chelation therapy. A strongly positive urinary coproporhyrin test suggests lead toxicity. If patient is symptomatic, obtain blood and urine specimens for other tests, begin treatment immediately, and continue treatment until blood or other test results are available.

Symptoms and Findings: *Infants and Toddlers*—Early symptoms (anorexia, irritability, occasional vomiting, refusal to play, and other behavior change) and findings (anemia) are nonspecific and commonly found in other illnesses in this age group. Test toddlers with apparent iron deficiency for increased lead absorption also. Plumbism in this group is often not recognized until acute encephalopathic state (persistent vomiting, stupor, ataxia, intractable convulsions, coma.) Even at this stage, there may be no specific findings pointing to lead. Do special tests given here.

Older Preschool Child—Clinical presentation given here is less common. May have nonspecific seizure disorder, developmental regression, autism, or severe behavior disorder.

School Age, Adolescent—Acute poisoning, metallic taste, dry mouth, nausea, vomiting, irritability, weakness, colicky abdominal pain, constipation, pain and tenderness in arms and legs. In severe acute cases, there may be an hemolytic crisis and/or acute renal injury.

Symptoms may regress spontaneously in all age groups if excessive intake abates.

Treatment: Identification of source if overexposure, and separation of the child from it is the most important aspect of treatment. Chelation therapy serves to reduce dangerous soft tissue lead levels quickly and is most efficacious if given in the subclinical stage on the basis of clearly abnormal metabolic tests.

Acute symptomatic plumbism—If patient is status epilepticus, give diazepam (0.05 to 0.1 mg/kg, IV) to obtain initial control of seizures. Thereafter, use paraldehyde to maintain control (2 to 5 ml in cottonseed oil by rectum). Give doses in the prodromal stage, as needed, until patient is recovered and started on long-term anticonvulsant therapy. Establish adequate urine flow, but do not overhydrate. Initially, give 10% dextrose and water (10 to 20 ml/kg) over 1 to 2 hours If this fails, try mannitol (1 to 2 gm/kg, IV) in 20% solution at a rate of 1 ml/minute Once urine flow is established, restrict intravenous fluid therapy to basal water and electrolyte requirements and minimal estimate of replacement needs. Adjust infusion to produce urine output of 350 to 500 ml/M^2/24 hours. Taper infusion and begin oral liquids only when symptoms have abated (usually 1 to 4 days). Surgical decompression is contraindicated. Do not waste time with enemas if patient is symptomatic. Even mildly symptomatic patients and asymptomatic patients with >100 μg Pb, and those with abnormal metabolic tests, should be handled with similar precautions, use parenteral rather than oral fluids during the first 24 to 48 hours. Do not give medicinal iron (oral or parenteral) concurrently with BAL (dimercaprol), use transfusions, if absolutely necessary for severe anemia. Chelation therapy BAL in oil (500 mg/M^2/24 hours) given deep intramuscularly in divided dose every 4 hours. CaEDTA 20% solution with 0.5% procaine added (1,500 mg/M^2/24 hours) given deep intramuscularly in divided dose every 4 hours. First dose, inject BAL only. Four hours later and every 4 hours thereafter for 5 to 7 days, inject BAL and CaEDTA at separate, rotated, deep intramuscular sites. For encephalopathy, give full 5- to 7-day course. Repeat courses may be necessary 1 to 4 weeks later. In milder cases without central nervous system symptoms, BAL may be discontinued after 1 to 3 days, and the dose of CaEDTA reduced to 1,000 mg/M^2/24 hours, divided into two intramuscular doses every 12 hours. Penicillamine (investigational use) has been used for follow-up therapy (750 mg/M^2/day) but is not recommended for initial therapy.

Subclinical Plumbism—For patients with 50 to 80 μg Pb who also show abnormal ALA-D and/or EP tests, CaEDTA

(1,000 mg/M²/24 hours) in divided dose every 12 hours, intramuscularly, for 3 to 5 days is appropriate. This may be followed by penicillamine (750 mg/M²/day), given orally 2 hours before meals on an empty stomach. In these patients, control of absorption is more important than drug therapy.

Prospectively Screened Asymptomatic Children with Elevated Blood Lead Levels—Recheck blood lead level (risk of contamination in collection and errors in analysis are considerable). Careful environmental history for possible sources, indications for therapy not clearly established in group with <80 μg Pb. In general, restrict chelation therapy to patients with metabolic evidence of subclinical plumbism and increased storage (positive long bone x-rays).

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Librium (Chlordiazepoxide)

Type of Product: Sedative, minor tranquilizer.

Manufacturer: Roche Laboratories, Division of Hoffman-La Roche, Inc., Nutley, New Jersey 07110.

Ingredients/Description: Librium—5, 10, and 25 mg tabs. Libritabs—5, 10, and 25 mg tabs. Librax—5 mg chlordiazepoxide plus 2.5 mg Clidinium bromide. Menrium—10 mg chlordiazepoxide plus estrogens.

Toxicity: Adults have taken up to 2,250 mg with only ataxia or prolonged sleep. May produce exaggerated response in elderly patients and paradoxical stimulation in psychiatric patients.

Symptoms and Findings: Drowsiness, dizziness, speech difficulties (dysarthria), and ataxia are the most common side effects. Hypotension has been observed. Respiratory activity is not usually impaired. In massive overdoses, as in attempted suicide, profound sedation may occur; but, this usually found only in mixed intoxications.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Saline cathartic is recommended. Monitor vital signs. Maintain body temperature, give intravenous fluids to correct hypotension; maintain airway, and ventilate if necessary. Hemodialysis for chlordiazepoxide is of little value.

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Lomotil (Diphenoxylate Hydrochloride + Atropine)

Type of Product: Antidiarrheal agent.

Manufacturer: Searle Laboratories, Division of G.D. Searle and Company, Box 5110, Chicago, Illinois 60680.

Ingredients/Description: Diphenoxylate hydrochloride, 2.5 mg; atropine, 0.025 mg.

Toxicity: Diphenoxylate is a narcotic. Serious respiratory depression has been caused by ingestion of five tablets by a 22-month-old child and four tablets by a 10-month-old infant. May produce hepatic coma in patients with impaired liver function.

Symptoms and Findings: Early symptoms include signs of atropinism; however, respiratory depression is the main symptom of concern. Diphenoxylate hydrochloride may potentiate barbiturates and tranquilizers. Respiratory depression may occur as late as 12 to 24 hours after ingestion. Carefully monitor the child for at least 48 hours. Ileus that simulates mechanical obstruction may occur.

Treatment: Perform gastric lavage with normal saline or induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary). For severe symptoms, naloxone hydrochloride should be administered (0.01 mg/kg, IV). This dose may need to be repeated every 15 to 30 minutes until pulmonary ventilation remains adequate. If there is urinary retention from atropine, catheterization is indicated.

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Rosenstein, G., Freeman, M., Standard A. L., et al: Warning: The use of Lomotil in children. PEDIATRICS, 51:132, 1973.

Searle, G. D., and Company, Medical Department, information from manufacturer.

LSD, LSD-25

Type of Product: Hallucinogen.

Manufacturer: No legal manufacturer except for research trade.

Ingredients/Description: d-Lysergic acid diethylamide (a tryptamine derivative). Distribution in 25 μg tablets (small white pills); 100 μg ampules (a tasteless, colorless, odorless liquid); crystalline powder in capsules; or sugar cubes, cookies, or crackers saturated with 100 to 200 μg of LSD.

Synonyms and Sources—Acid, morning glory seeds ("Heavenly Blue"), "Pearly Gates," "Flying Saucers," "Wedding Bells," "Summer Skies," "Badoh negro" (varieties of *Ipomoea violacea L.*); seeds of baby wood rose (*Argyreia nervosa Boj.*); ergot (*Claviceps purpura Tul*).

Toxicity: Twenty micrograms will cause noticable reactions in adults; 100 μg constitutes average dose; 250 μg is extremely intoxicating; 250 morning glory seeds (five packets) have produced acute psychosis.

Symptoms and Findings: LSD affects the central nervous system inducing periods of intoxication alternating with normalcy. Effects include dilation of pupils, tremor, fever, elevated blood pressure, and hyperactive reflexes. Disturbance of sight, hearing, sense of touch, and perception of time and space. Colors are intensified, objects seem to acquire third dimension and emotional impact. There are delusions and hallucinations of music and voices. There may be chills or sweating, a sense of weightlessness and floating; arms and legs may be held in one position for a long time. The subject exhibits psychopathic personality disorders; may feel exalted or depressed, sometimes with fears of persecution, weeping, wild laughter, or panic; may require restraint to prevent violent or bizarre actions. Homicidal and suicidal urges are common. Of 221 cases of adverse reactions to the drug, there were 19 attempted and 11 successful homicides. Acute symptoms wear off in 5 to 8 hours, and patient has fatigue and tension; periodic states of psychosis may recur over a period of several

weeks or months. Morning glory seed psychosis is similar to that induced by LSD, but is accompanied by lower blood pressure and pulse rate, below normal temperature, and frequent urination.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Bed rest and forcing fluids are helpful, as is "talking down" or providing reassurance, sympathy, and psychologic support. Tranquilizers and sedatives are effective only in doses high enough to produce severe sedation. Chlorpromazine may be given only if there is positive proof of LSD intoxication. Diazepam is preferable (5 to 25 mg, PO or IM). If blood pressure is depressed, all central nervous system depressant drugs—especially the phenothiazines—should be used with caution.

References

Deichmann, W B, and Gerarde, H W: Symptomatology and Therapy of Toxicological Emergencies New York Academic Press, 1964.
Dreisbach, R H: Handbook of Poisoning Diagnosis and Treatment, ed. 8. Los Altos, California Lange Medical Publishers, 1974
Ingram, A. L; Jr Morning-glory seed reaction J A M A, 190:1133, 1964.

Lysol Liquid Disinfectant Toilet Bowl Cleaner

Type of Product: Bowl cleaner.

Manufacturer: Lehn and Fink Products Corporation, Montvale, New Jersey 07645.

Ingredients/Description: Hydrochloric acid, 8.50%; benzalkonium chloride, 0.30%; N-alkyl dimethyl ethylbenzyl ammonium chloride, 0.30%.

Supplied in 1 pint squeeze bottles with flip-up cap.

Toxicity: Strongly acidic. As little as 1 ml of a concentrated mineral acid has caused death, but recovery has followed ingestion of as much as 60 ml of concentrated (37%) hydrochloric acid. Although quaternary ammonium compounds are toxic, the major toxicity of this product would be the corrosive effect of the acid.

Symptoms and Findings: Corrosive burns to eyes and mucous membranes, with burning pain of mouth and esophagus, nausea, vomiting, epigastric pain, shallow respiration, and circulatory collapse. Glottic or pulmonary edema and gastric perforation may occur.

Treatment: *Ingestion*—Dilute at once with milk or water. Give gastric antacids such as milk of magnesia, aluminum hydroxide (avoid carbonates or bicarbonates) to buffer the acid. Do not induce emesis. Avoid lavage (danger of perforation or aspiration). Symptomatic and supportive (see Alkali, page 5).

Eyes—Flush with copious amounts of water. Consult ophthalmologist.

Skin—Wash thoroughly with large amounts of water.

References

Lehn and Fink Products Corporation, information from manufacturer.
National Clearinghouse for Poison Control Centers, Washington, D.C., card file index

Malathion

Type of Product: Organophosphate insecticide.

Manufacturer: Various.

Ingredients/Description: Powder or liquid. Constituent of many pest control products.

Toxicity: This substance has a low toxicity estimated at 1 gm/kg in rats. It may be absorbed through skin, lungs, and gastrointestinal tract.

Symptoms and Findings: The signs and symptoms may be classified according to three points of action of acetylcholine.

Parasympathetic effects—Usually the first to appear and include anorexia, nausea, sweating, epigastric and substernal tightness, heartburn, and tightness in the chest. More severe exposures produce abdominal cramps, increased peristalsis, diarrhea, salivation, lacrimation, profuse sweating, pallor, and dyspnea. Involuntary defecation and urination, excessive bronchial secretions, bronchospasm, and pulmonary edema may occur in severe cases of poisoning.

Effects on Voluntary Muscles—Generally appear after parasympathetic effects have reached moderate severity. Include muscle twitching, fasciculations, and cramps, followed by weakness, ataxia, and paralysis.

Central Nervous System Effects—Less common than the parasympathetic and muscular effects, and may be entirely absent; includes tension, restlessness, and emotional lability. Greater exposure to organic phosphates produces headache, tremor, drowsiness, and confusion. Lethal or near lethal doses

may produce convulsions, areflexia, and finally respiratory arrest.

Treatment: Atropine (0.5 to 1 mg, IV) as soon as possible. Repeat at 5- to 10-minute intervals until signs of atropinization appear. In severe anticholinesterase poisoning, 40 mg of atropine sulfate may be given in a day without producing symptoms attributable to atropine. Support respiration. Positive pressure oxygen may be necessary. Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with 5% sodium bicarbonate. Decontaminate skin with soap and water. Never give morphine, theophylline, or aminophylline. Observe patient constantly for 24 to 36 hours. Wear rubber gloves in removing clothes and washing the patient. Protopam chloride (PAM–2 pyridine aldoxime methochloride), intravenously, is recommended as a supplement to atropine after cyanosis is overcome. PAM is an anticholinesterase reactivator. The manufacturer's dosage directions on the package should be followed. PAM has been used by some investigators up to a maximum total dose of 300 mg/kg in 48 hours. PAM is not a substitute for atropine (see Clinical Handbook on Economic Poisons for more details). There is no evidence that children require a larger dose of atropine sulfate (0.015 to 0.05 mg/kg) or pralidoxime chloride (15 mg/kg) than adults.

References

Gitelson, S., Aladjemoff, L., Ben-Hador, S., and Katznelson, R.: Poisoning by a malathion-xylene mixture, J.A.M.A., 197:819, 1966.

Hayes, W. J.: Clinical Handbook on Economic Poisons: Emergency Information for Treating Poisoning P H S Publication 476, rev Atlanta, Georgia U S Communicable Disease Center, Toxicology Section, 1963.

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index

Meprobamate (Miltown, Equanil)

Type of Product: Hypnotic, sedative, muscle relaxant, minor tranquilizer.

Manufacturer: Wallace Pharmaceuticals, Half Acre Road, Cranbury, New Jersey 08512; Wyeth Laboratories, Division of American Home Products Corporation, P.O. Box 8299, Philadelphia, Pennsylvania 19101.

Ingredients/Description: Meprobamate supplied as: tablets, 200 and 400 mg; coated tablets, 200 and 400 mg; capsules, 400 and 600 mg; liquid, 200 mg/5 cc.

Combination with other drugs in various dose forms.

Toxicity: Readily absorbed from the gastrointestinal tract. Peak blood concentrations occur within 1 to 2 hours after ingestion and decline steadily for 10 hours or more. Meprobamate is excreted in the urine (about 10% unchanged, and almost 90% as hydroxymeprobamate and glucuronide conjugate resulting from hepatic biotransformation). In adults, meprobamate intoxication with doses of 240 mg/kg and 350 mg/kg were fatal, death has also been reported with acute overdoses of 10 to 12 gm in adults, but survival has occurred with doses as high as 40 gm.

Symptoms and Findings: Central nervous system depression with lethargy, stupor, ataxia, deep sleep, coma, and shock. Respiration, blood pressure, and pulse parallel the depth of sedation. Profound shock associated with vasomotor and respiratory collapse may occur. Convulsions have been noted during recovery.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. After evacuation of the stomach, administer activated charcoal, correct hypotension with fluids and vasopressors (levarterenol, metaraminol) if necessary. Maintain respiration.

Osmotic diuresis may hasten excretion. Hemodialysis or peritoneal dialysis may prove beneficial in severe intoxications. In suicide attempts with ingestion of amounts up to 42 gm meprobamate, symptomatic and supportive treatment—including parenteral fluids and vasopressor agents—have frequently proved adequate. Hemodialysis may be considered when plasma meprobamate levels approach 20 mg/100 ml. If excessive dosage has continued for a prolonged period, drug withdrawal may result in an abstinence syndrome.

References

Bloomer, H. A. The clinical and biochemical features of meprobamate intoxication. Clin. Res., 14:186, 1966.

Blumberg, A. G., Rosett, H. L., and Dobrow, A. Severe hypotensive reactions following meprobamate overdosage. Ann. Intern. Med., 51:607, 1959.

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Maher, J F, and Schreiner, G E: The clinical dialysis of poisons Trans. Amer Soc Artif Intern Organs, 11 349, 1965.

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Picchioni, A L, ed · Control of poisonings. Forced diuresis and alkalinization of urine in treatment of poisoning Amer J Hosp. Pharm, 21·244, 1964

Mercury, Mercury Salts

Type of Product: Antiseptics, fungicides, pigments, diuretics.

Manufacturer: Various.

Ingredients/Description: Many salts of mercury are available. No characteristic form or preparation. Products usually well labelled with ingredients.

Toxicity: Estimated oral fatal dose of mercuric chloride is 0.4 to 4 gm for adults Fatalities have occurred from 0.2 gm. Poisoning may result from absorption of mercury through skin from ointments. By ingestion, metallic mercury (as in thermometers) is not toxic. Inhalation of mercury vapor can cause serious pulmonary illness. In poisoning caused by absorption of organic mecurials, neurologic manifestations may predominate over gastrointestinal and renal manifestations.

Symptoms and Findings: *Acute Poisoning*—The alimentary absorption of corrosive mercury salts is so rapid that the course and prognosis are determined by the events of the first 15 minutes after ingestion. Early symptoms include violent pain in the upper alimentary tract, profuse vomiting of mucoid material and blood, severe purging with liquid, bloody stools. This may progress to prostration, collapse, and death from peripheral vascular collapse. Mercury vapor inhalation produces metallic taste, nausea, abdominal pain, vomiting, diarrhea, headache, and occasionally albuminuria. By either route of poisoning, in 1 to 3 days the patient may develop swelling of the salivary glands, stomatitis, renal tubular degeneration, and anuria In milder cases, recovery occurs within 10 to 14 days: in others, poisoning of the chronic type accompanied by muscular tremors and psychic disturbances may occur. Many organic mercurial compounds used in agriculture produce severe central nervous system symptoms, including ataxia, restriction of visual fields and delirium. If the victim survives the acute phase of mercury poisoning, the second phase is characterized by stomatitis, gastritis, colitis, and severe renal tubule degeneration.

Chronic Mercury Poisoning—The disease may become manifest rapidly. There may be vasomotor disturbances in the skin with inflammatory reactions, eczema, petechial hemorrhages, excessive perspiration, desquamation of the skin, and dystrophy of the fingernails. Gastrointestinal symptoms are characterized by either an increase in or lack of appetite, foul breath, salivation, metallic taste, gingivitis, stomatitis, vomiting, and diarrhea. The gingiva may be spongy and ulcerated, and the teeth discolored, fragile, and loose. Nervous system symptoms include irritability, mental hyperactivity, insomnia, anxiety, easy fatigability, slowed mentation, forgetfulness, timidity, loss of memory, and childishness. Neuromuscular disturbances include fine intention tremors starting in the fingers and extending to the arms and legs, jerky movements of the limbs, the head, and the trunk appear later. Loss of coordination, unsteady gait, the deep reflexes become exaggerated, and there may be clonus. Death is usually the result of complete renal failure.

Treatment: Empty stomach immediately by inducing emesis (Ipecac Syrup, 15 ml PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or performing gastric lavage with normal saline Give activated charcoal, milk, egg white. Give BAL (dimercaprol) by injection immediately and before attempts to evacuate the stomach Dose for BAL: 500 mg/M²/24 hours in divided dose every 4 hours by deep intramuscular injection. Taper dose after 48 hours if the patient is improving Consult standard pharmacology texts for exact dosage schedule. Treat shock by correcting dehydration and electrolyte imbalance Watch for acute renal failure. In mercury vapor inhalation, oxygen and mist should be added to the treatment, and the use of prophylactic antibiotics should be considered.

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Goodman, L S, and Gilman, A, ed The Pharmacological Basis of Therapeutics, ed 5. New York MacMillan, 1975

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Mescaline

(Peyote Buttons, Peyote Powder)

Type of Product: Hallucinogen.

Manufacturer: No legal manufacturer except for research purposes.

Ingredients/Description: Derived from peyote cactus (*Lophophora williamsii* Coulter). Mainly 3,4,5-trimethoxyphenethylamine— 0.41% in fresh peyote cactus heads; 3.7% in dried upper slices of mescal buttons. Peyote is unpleasant, bitter, and acrid: causes slight burning sensation and itching of mucous membranes, hence the "buttons" are brewed with tea or chewed while drinking juices, milk, tea, coffee, or wine. The powder is often mixed with jello; decoctions may be injected intravenously.

Toxicity: Of low potency—300 to 500 mg versus 100 to 200 μg for LSD. 18 to 25 capsules of peyote powder are equivalent to 400 mg mescaline. Pure mescaline is rare in street drug traffic. LSD, STP (2,5-dimethoxy-4-methylamphetamine), or PCP (phencyclidine) are usually substituted.

Symptoms and Findings: Variable latent period (10 minutes with 0.5 gm mescaline sulfate, IV) precedes nausea; dizziness; sweating; headache; palpitation; heat or chilliness; and cramps in chest, neck, or abdomen. These effects subside in 1 to 2 hours. Mydriasis occurs and persists throughout intoxication which follows and includes multicolored visions; hypersensitivity to sound, disturbed senses of touch, taste, smell, space, and time, and a distorted concept of the subject's own body. Initial euphoria and glee are followed by anxiety (sometimes depression and hostility), inability to concentrate, loss of control over speech and action, and general schizophrenic psychosis. Mescaline is nonaddictive.

Treatment: If ingested quantity is large, induce emesis (Ipecac Syrup, 15 ml; PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Endeavor to calm patient by "talking him down." Drug is self-limiting; average duration is 4 to 5 hours. After effects: indolence, headache, profound sleep, sometimes lingering visual hyperesthesia.

Warning: Administration of phenothiazines can cause serious or fatal results if the drug taken is STP or PCP, or if mescaline is adulterated with strychnine or belladonna.

References

Dreisbach, R H · Handbook of Poisoning· Diagnosis and Treatment, ed. 8 Los Altos, California: Lange Medical Publishers, 1974.

Kapadia, G J, and Fayez, M B. E.: Peyote constituents: Chemistry, biogenesis, and biological effects. J Pharm. Sci, 59:1699, 1970

McLaughlin, J L: Peyote. An introduction Lloydia, 36.1, March, 1973

Methadone

Type of Product: Narcotic analgesic

Manufacturer: Eli Lilly and Company, Indianapolis, Indiana 46206; Bristol Laboratories, Division of Bristol-Myers Company, P.O. Box 657, Syracuse, New York 13201.

Ingredients/Description: A synthetic narcotic which is slightly more potent than morphine on a weight basis. It is used extensively to prevent withdrawal symptoms in narcotic addicts. Chemically and structurally related to propoxyphene.

Toxicity: The average maintenance dose (80 to 120 mg) produces no toxic effects in dependent patients. However, this same dose may cause severe respiratory depression or death in nontolerant adults. Infants and children may suffer from severe respiratory depression after 10 to 15 mg of the drug. In addicts the minimal lethal dose may be as high as 1,000 to 1,200 mg.

Symptoms and Findings: Respiratory depression is the dominant symptom and cause of death. Other symptoms are drowsiness, sweating, mental depression, nausea, vomiting, pruritus, pinpoint pupils, convulsions, circulatory collapse, coma. Delirium, hallucinations, and hemorrhagic, urticaria rarely occur. Nontolerant adults and children who ingest a full, adult, maintenance dose become progressively more comatose over a period of ½ to 3 hours; if untreated, they die of respiratory failure within that time.

Treatment: Support respiration if breathing has stopped, or if its rate or depth has become too low to maintain effective ventilation. Naloxone hydrochloride (Narcan) 0.01 mg/kg, IV, is the specific antidote. If respiration improves after the first injection but it is not yet adequate, the dose should be repeated in 5 minutes and again in 10 minutes. If the injection has no significant effect, the diagnosis of narcotic overdose may be in error. Establish a routine of close observa-

tion, this is important because the antidotal action of the narcotic antagonist is shorter than the duration of respiratory depression, which may last from 24 to 48 hours following methadone injection. After successful initial resuscitation, further injections of the narcotic antagonist may be given intramuscularly. The intramuscular dose should be about 50% greater than the intravenous dose. Maintain adequate oxygenation and hydration. Gastric lavage with normal saline may be carried out. Dialysis is not indicated.

References

Dole, V P, Foldes, F. F. Trigg, H, Robinson, J W. and Blatman, S: Methadone poisoning N Y State J Med, 71:541, 1971.

National Clearinghouse for Poison Control Centers, Washington, D C, card file index.

Methaqualone (Sopor, Quaalude)

Type of Product: Hypnotic

Manufacturer: *Sopor*—William H. Rorer, Incorporated, 500 Virginia Drive, Fort Washington, Pennsylvania 19034; *Quaalude*—Arnar-Stone Laboratories, Incorporated, 601 E. Kensington Road, Mt Prospect Illinois 60056.

Ingredients/Description: Available in tablets containing 150, 200, 250, and 300 mg

Toxity: In adults, oral doses of 8 to 20 gm (100 to 200 mg/kg) have caused death. survival has followed the ingestion of as much as 24 gm (more than 300 mg/kg). In some fatal cases large amounts of alcohol were also ingested. Delay in starting supportive care has been a factor in some deaths when doses were in the moderate range. There is a correlation between dose, severity of symptoms, and duration of sedation.

Symptoms and Findings: At the lower range of toxic doses (40 to 80 mg/kg), symptoms are similar to other sedatives; dizziness, ataxia, slurred speech, drowsiness, nystagmus, nausea, vomiting, and epigastric discomfort have been recorded. At higher doses, increased muscle tone, agitation, increased motor activity, and tonic convulsions are usually seen. Deep tendon reflexes may be increased.

Respiratory depression is noted by poor ventilation, although respiratory rate may be normal or increased. Cough reflex is diminished. Blood pressure is normal. In severe poisoning (>200 mg/kg), respiratory depression, apnea, deep

coma, hypotension, oliguria, hemorrhage (in gastrointestinal tract, retina, or skin), liver toxicity, and cerebral and pulmonary edema have been recorded. Upgoing plantar reflexes have been reported but are uncommon; deep tendon reflexes and corneal and gag reflexes are absent. Polyneuropathy is reported. Tonic seizures are associated with dysrhythmic pattern on EEG Pupils are middilation and fixed. Both hypothermia and hyperthermia may occur, but hyperthermia may be a sign of aspiration pneumonia.

Treatment: If patient is still alert with gag reflex, induce emesis (Ipecac Syrup, 15 ml PO, followed by 1 cup of water; repeat in 20 min if necessary). If in coma, perform gastric lavage with normal saline after snug fitting endotracheal tube is in place. Supportive measures include assisted ventilation when clinically indicated, maintenance of urinary output and fluid and electrolyte balance; forced diuresis has little value. Treat tonic seizures with diazepam (0.05 to 0.1 mg/kg, IV). If toxicity is severe, succinylcholine with supportive ventilation may be required. hemodialysis may be used Although dialysance is not high, accelerated clinical improvement has been reported. Results of peritoneal dialysis have not been reported. Isoproterenol or levarterenol infusions may be used, along with appropriate hydration with balanced hydrating fluid or plasma expanders to elevate the blood pressure

References

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Johnstone, R E, Manitas, G T, and Smith, E J · Apnea following methaqualone ingestion Report of a case Ohio State Med J, 67:1018, 1971

National Clearinghouse for Poisoning Control Centers, Washington, D C, card file index

Wallace, M R, and Allen, E · Recovery after massive overdose of diphenhydramine and methaqualone Lancet, 2·1247, 1968

Methyl Alcohol

Type of Product: Solvent, antifreeze, fuel

Manufacturer: Various.

Ingredients/Description: Used as solvent for paint where it is usually referred to as wood alcohol. Some antifreeze and windshield washer fluids contain methyl alcohol. An ingredient in canned fuels.

Toxicity: As little as 2 teaspoonsful of methyl alcohol is considered toxic if ingested. The fatal adult dose of methyl alcohol is 2 to 8 fl oz.

Symptoms and Findings: The combination of gastrointestinal and visual symptoms follow a latent period of 6 to 36 hours. Headache, nausea, vomiting, epigastric pain, visual disturbances, blurred vision (hyperemia of optic disc), pupils often dilated and sluggish, cyanosis and dyspnea, coma; bradycardia is a poor prognostic sign. Acidosis is the result of oxidation of methyl alcohol to formic acid and formaldehyde. Shock. Death may be caused by respiratory failure or circulatory collapse. Possible cerebral edema, delirium, convulsions. Permanent loss of vision may occur in survivors. Hypoglycemia may occur acutely.

Treatment: Induce emesis (Ipecac Syrup, 15 ml; PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with a 3 to 5% sodium bicarbonate solution. Check serum electrolytes and pH. If poisoning is severe, combat acidosis vigorously with bicarbonate-containing fluids and electrolytes intravenously. Ethyl alcohol, which inhibits the conversion of methyl alcohol to formate and formaldehyde by competing for the alcohol dehydrogenase enzyme, has been beneficial. Ethyl alcohol may be given orally or intravenously (as a 5% solution in bicarbonate or normal saline), in doses of 0.75 gm ethanol per kilogram (60 ml of 95% ethyl alcohol in adults) followed by 0.5 gm/kg at 4-hour intervals. Extracorporeal or peritoneal dialysis is recommended if poisoning is severe. Observe for cerebral edema. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Symptomatic and supportive treatment for respiratory distress, coma, and shock.

References

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Pfister, A. J., McKenzie, J. V., Dinsmore, H P, and Edman, C D Extracorporeal dialysis for methanol intoxication J A M A, 197:1041, 1966.

Multivitamins with Minerals

Type of Product: Dietary supplement.

Manufacturer: Various.

Ingredients/Descriptions: See Table 10.

Toxicity: Low. Relates primarily to iron and vitamin A. See Iron Salts (page 48) for full discussion of iron toxicity and therapy. Single ingestions of vitamin A of 100,000 IU may cause toxicity. Decision on excess ingestion may be aided by a serum level if available. The normal blood level is less than 40 μg/ml. Increased intracranial pressure is the most common feature of both acute and chronic vitamin A intoxication. Diplopia, headache, lethargy, nausea, vomiting, and tinnitus are the usual findings.

Symptoms and Findings: Gastrointestinal irritation possible. Increased intracranial pressure is the most common feature of acute vitamin A intoxication. Diplopia, headache, lethargy, nausea, vomiting, and tinnitus are the usual findngs.

Treatment: *Induce emesis* (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water or milk; repeat in 20 minutes if necessary) or perform gastric lavage. Give charcoal.

Increased intracranial pressure can be treated with dexamethasone, 4 mg stat and 1 mg every 4 to 6 hours for infants and children. Alternately, mannitol can be used intravenously in a dose of 1 gm/kg, IV, to a maximum of 25 gm dose. Blood pressure and fluid balance monitoring is mandatory.

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TABLE 10

MULTIVITAMINS WITH MINERALS

Ingredient	Amount Per Dose Unit	Toxic Dose
Vitamin A	4,000–25,000 U	100,000 U to infant may cause acute toxicity.
Vitamin C	50–200 mg	
Vitamin D	400 U	Single doses of 400,000 U nontoxic for neonates.
Vitamin E	10 U	
B_1 thiamine	10 mg	
B_2 riboflavin	3 mg	
Niacinamide	10–100 mg	LD_{50} IV, dogs: 4 gm/kg
B_6 pyridoxine	2.5 mg	
B_{12}	6 μg	
Folic Acid	1 μg	
Calcium	50–250 mg	
Cobalt	0–0.2 mg	500 mg $CoCl_2$ causes acute gastritis, shock in adults
Copper	0–1 mg	10 gm copper sulfate is estimated fatal adult dose
Fluoride	0–1 mg	230–500 mg to child causes acute toxicity, 1 gm is lowest fatal dose
Iodine	0–0.2 mg	500 mg reported fatal in adult
Iron	10–40 mg	40–100 mg/kg elemental iron is usual lethal dose
Magnesium	0–10 mg	Absorption 20% oral dose
Manganese	1.0–1.5 mg	
Molybdenum	0–0.2 mg	
Phosphorus	0–80 mg	
Zinc	1.0–1.5 mg	500 mg zinc sulfate causes vomiting in adult

Naphthalene

(Naphthalin, Naphthene, Tar Camphor)

Type of Product: Ingredient in moth balls and toilet deoderizers.

Manufacturer: Various

Ingredients/Description: Napthalene ($C_{10}H_8$) is a colorless, crystalline hydrocarbon from coal tar distillates used in moth balls (now more commonly made with paradichlorobenzene) and, toilet deodorizers, and as raw material for aniline dyes. Confusion may arise from use of the term naphthene in the petroleum industry for the cyclic hydrocarbons, C_nH_{2n}, found particularly in the aromatic fractions of petroleum such as kerosene

Toxicity: The lethal oral dose of moth ball naphthalene is probably 5 to 15 gm. but sensitivity varies considerably. It induces hemolytic crisis (after 1 to 3 days' delay) in G-6-PD-deficient individuals and to a lesser degree in normal infants.

Symptoms and Findings: Acute gastrointestinal irritation; central nervous system irritation with headache, sweating, listlessness, confusion, convulsions, coma; irritation of the urinary bladder with dysuria, passage of brown urine (naphthalene derivatives); acute intravascular hemolysis (primarily in G-6-PD deficiency) by day three with anemia, jaundice, and hemoglobinuria.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with large amounts of normal saline followed by a cathartic of magnesium hydroxide or sulfate. Do not give mineral or other oils because they increase absorption. An immediate screen for the erythrocyte G-6-PD activity, reticulocytosis, methemoglobin, and red cell fragmentation is helpful. If acute hemolytic anemia occurs, treat with hydration, alkaline diuresis, and small transfusions of packed cells.

Reference

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products: Acute Poisoning, ed. 3. Baltimore: Williams and Wilkins, 1969.

No Doz

Type of Product: Stimulant.

Manufacturer: Bristol Myers Company, 345 Park Avenue, New York, New York 10022.

Ingredients/Description: Caffeine, 100 mg per tablet or chewable mint. Tablets supplied in containers of 15, 36, and 60. Chewable mints supplied in containers of 15 and 26, and referred to as "action aids."

Toxicity: A 1 gm dose produces symptoms in adults, and 10 gm is the estimated fatal oral dose, a 3.2 gm intravenous dose was fatal.

Symptoms and Findings: Vomiting, central nervous system stimulation, restlessness, excitement, mental confusion, tinnitus, low grade fever, flushing, diarrhea, diuresis, cardiac palpitation and extrasystoles, tachycardia, shivering, tremors, convulsions.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV).

References

Bristol Myers Company, information from manufacturer

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: Clinical Toxicology of Commercial Products Acute Poisoning, ed. 3, Baltimore: Williams and Wilkins, 1969.

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Reimann, H. A.: Caffeinism: A cause of long-continued, low-grade fever. J.A.M.A., 202:1105, 1967.

Noludar (Methyprylon)

Type of Product: Nonbarbiturate hypnotic.

Manufacturer: Roche Laboratories, Division of Hoffmann-La-Roche Inc., Nutley, New Jersey 07110.

Ingredients/Description: Methyprylon, 50 and 200 mg tablets.

Toxicity: Death reported from 6 gm. One patient survived 20 gm.

Symptoms and Findings: Central nervous system depression, shallow respiration, hypotension, coma, hyperpyrexia, or subnormal temperature.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Support respiration, oxygen, intravenous fluids as necessary. Other treatment is supportive.

References

Hoffman-LaRoche, information from manufacturer
National Clearinghouse for Poison Control Centers Washington, DC, card file index

Nytol

Type of Product: Antihistaminic sedative.

Manufacturer: Block Drug Company, Jersey City, New Jersey 07303.

Ingredients/Description: Each tablet contains: methapyrilene hydrochloride, 25 mg; salicylamide, 200 mg.

Note: In Canada, Nytol contains 325 mg calcium bromido lactobionate per dose.

Toxicity: Methapyrilene hydrochloride has estimated an LD_{50} of 25 to 50 mg/kg, some fatalities from 10 mg/kg. Salicylamide has an oral LD_{50} in rats of 1.2 to 2.0 gm/kg.

Symptoms and Findings: Methapyrilene hydrochloride, an antihistamine, may produce sedation, gastrointestinal disturbances, and convulsions. Salicylamide, unlike salicylates, causes little gastric irritation or central nervous system stimulation, metabolic acidosis, or hypoprothrombinemia; but, it may cause central nervous system depression, hypotension, and respiratory arrest.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Administer activated charcoal (5 to 25 gm) after evacuation of the stomach. Hypotension from salicylamide is of short duration so fluids may be all that is required. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Antihistamines exert anticholinergic effects. Physostigmine salicylate is an antidote for severe intoxication from antihistamines and other anticholinergic drugs. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed, and

the patient's symptoms may return within 1 to 2 hours. Neostigmine is ineffective in reversing the effects of anticholinergic drugs on the central nervous system.

Reference

National Clearinghouse for Poison Control Centers Washington, DC, card file index.

Old English Furniture and Scratch Cover Polish

Type of Product: Furniture polish.

Manufacturer: Boyle Midway, Division of American Home Products, Cranford, New Jersey 07016.

Ingredients/Description: Mineral seal oil (petroleum distillate), 67%; ink oil (lubricating oil), 33%.

Older ink-oil formulations also contained soft asphalt, but have been discontinued. The new ink-oils are lubricating oils with high viscosity ratings (from 120 to 4,500 SUS).

Toxicity: Aspiration of as little as a few milliliters of mineral seal oil may prove fatal. Estimated lethal, oral, adult dose of petroleum distillates is 3 to 4 fl oz (if not aspirated). See Kerosene and Petroleum Distillates, page 52.

Symptoms and Findings: Central nervous system depression, chemical pneumonia and pulmonary edema (see Kerosene and Petroleum Distillates, page 52)

Treatment: See Kerosene and Petroleum Distillates, page 52.

References

See section on Kerosene and Petroleum Distillates.

Paradichlorobenzene

Type of Product: Insecticide. Moth balls.

Manufacturer: Various.

Ingredients/Description: Paradichlorobenzene is used for killing moths and their larvae, roaches, termites, tree borers, and other insects. Also used as toilet bowel deodorant cakes, usually with an added perfume of similar volatility. A common form of moth balls.

Toxicity: Lethal oral dose is estimated to be from 500 to 5,000 mg/kg. Ingestion of 20 gm (300 mg/kg) has been well tolerated. Skin absorption is insignificant. Vapors are irritating.

Symptoms and Findings: Vapors are irritating to the eyes and mucous membranes, and chronic exposure to them produce headache, vertigo, weakness, and excitement similar to alcohol intoxication. Ingestion of large amounts produces gastrointestinal irritation, pain, nausea, vomiting, and diarrhea. Possible central nervous system stimulation or depression. Liver or kidney dysfunction may occur. Methemoglobinemia may occur. Anemia and cataracts have also been attributed to paradichlorobenzene.

Treatment: Do not give milk, oils, or fatty meals (these increase absorption). Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Following large ingestion, give sodium bicarbonate to alkalinize urine and prevent blockage with acid hematin crystals; force fluids to stimulate diuresis. Saline cathartic, demulcents. Give blood transfusions if indicated. Symptomatic and supportive otherwise.

References

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P. Clinical Toxicology of Commercial Products: Acute Poisoning, ed 3. Baltimore: Williams and Wilkins, 1969.

Shirkey, H. C., ed.. Pediatric Therapy, ed 4. St. Louis: C. V. Mosby, 1972.

Phenothiazine Tranquilizers

Type of Product: Tranquilizer, antiemetic.

Manufacturer: Various. Refer to specific drug in *Physician's Desk Reference*.

Ingredients/Description: The phenothiazine drugs are used as tranquilizers and antiemetics. They include:

1. Dimethylaminopropyl compounds: chlorpromazine (Thorazine), promazine (Sparine), triflupromazine (Vesprin).
2. Piperidyl compounds: thioridazine (Mellaril).
3. Piperazine compounds: acetophenazine (Tindal), carphenazine (Proketazine), fluphenazine (Permitil, Prolixin), perphenazine (Trilafon), prochlorperazine (Compazine), trifluoperazine (Stelazine).

Another chemically related compound is chlorprothixene (Taractan).

Toxicity: The toxic dose of the phenothiazines has not been well established. The phenothiazines may potentiate central nervous system depressant drugs. Toxicity may be prolonged with sustained release preparations. Extrapyramidal Parkinsonoid symptoms may occur with relatively small overdosage of these drugs. Infants and children are particularly sensitive to the phenothiazines, as are patients who are toxic, dehydrated, or febrile. Chlorpromazine may have been lethal at oral doses as low as 350 mg in a 4-year-old child and 2 gm in a female adult; a 17-year-old boy survived 17.5 gm. Promazine caused death in a 2-year-old child who ingested 1,000 mg. Fluphenazine ingestions of 20 to 30 mg have been reported in adults without symptoms, and ingestions of unknown amounts caused convulsions and coma. Prochlorperazine caused dysphagia and convulsions in a 4-year-old child after ingesting 30 mg, orally; a 7-year-old child exhibited opisthotonus after rectal administration of 50 mg.

Symptoms and Findings: Extrapyramidal dyskinetic reactions—even with relatively small overdosage—such as spasmodic torticollis, oculogyric crisis, akathisia or motor restlessness, jerky movements or twitching of the extremities, hyperirritability, tremors, dysphagia, and other Parkinsonoid manifestations may occur. Anorexia, blurred vision, headache, hypothermia, vertigo, disorientation, and excessive sedation with lethargy and stupor, hypotension, opisthotonus, tonic-clonic convulsions, coma, respiratory failure and/or vasomotor collapse—often sudden—has been the distinguishing feature in fatal cases of phenothiazine overdosage. Late manifestations include bone marrow depression, liver damage, and diuresis caused by a toxic effect on the renal tubules.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Lavage is indicated up to many hours after ingestion. In patients exhibiting only sedation and extrapyramidal signs, intramuscular diphenhydramine (Benadryl), 1 mg/kg, IM, should reverse most symptoms. Benztropine (Cogentin) 1 to 2 mg, IM or IV, is also effective. In large doses with stupor, coma, and/or hypotension, the patient requires hospitalization. A balanced hydrating fluid should be used to raise blood pressure. Levarterenol (Levophed drip) may be infused if fluids alone are inadequate. The patient should be in the head-down position

because phenothiazines are alpha adrenergic blocking agents and cause orthostatic hypotension Treat convulsions with diazepam (0 05 to 0.1 mg/kg, IV). Respiration must be closely monitored. Intubation and artificial ventilation may be required Exchange transfusion may be life-giving in infants. Dialysis is not considered beneficial.

References

Duffy, B. Acute phenothiazine intoxication in children Med J Aust, 1:676, 1971

Hollister, L. E Overdose of psychotherapeutic drugs Clin Pharmacol Ther, 7 142, 1966

National Clearinghouse for Poison Control Centers Washington, D C, card file index

Wallman, I S° Death from cholorpromazine poisoning Med J Aust, 2.903, 1957

Philodendron

Type of Product: House Plant.

Manufacturer: Not applicable

Ingredients/Description: Philodendron is a common ornamental plant, a member of the Araceae family. The plant has large, thick, waxy leaves with jointed fleshy stems. They also grow as vines with various leaf shapes, including the "cut leaf" philodendron or Mostera

Toxicity: Ingestion of large quantities of leaves or stems can cause extreme irritation of oral and respiratory mucosae. Toxic components include microscopic, needle-like calcium oxalate raphides, asparagine, and possibly an unknown protease A series of philodendron poisonings in cats—with 37 deaths—showed destruction of the kidney. Juice from the plant can cause edematous swelling of lips, tongue, and glottis in rabbits and guinea pigs.

Symptoms and Findings: Burning and irritation of the lips, mouth, and tongue Tongue can become swollen. Nausea, vomiting, and dyspnea may also occur.

Treatment: If ingestion of large amount of leaves or stems, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline Otherwise, treatment is supportive. Give demulcents (milk, mineral oil, or butter) and cold packs to lips and mouth In experimental animals, dyspnea can be prevented by parenteral antihistamines or epinephrine. In patients with alarming symptoms, diphenhydramine (10 to

25 mg, IV) may be tried The dose of aqueous epinephrine hydrochloride is 0 01 mg kg, SC or IV. Keep patient hydrated and watch for signs of kidney dysfunction.

References

Arena, J M Poisoning Toxicology—Symptoms—Treatments, ed 3 Springfield, Illinois Charles C Thomas, 1974

Hardin, J W, and Arena, J M Human Poisoning from Native and Cultivated Plants, ed 2 Durham, North Carolina Duke University Press, 1974

Pine-Sol

Type of Product: Household cleaner.

Manufacturer: Consumer Products Division, American Cyanamid Company, Wayne, New Jersey 07470

Ingredients/Description: Pine oil, approximately 35%, isopropyl alcohol, approximately 11%: o-chloro-p-phenylphenol and related compounds, 1%: soap; 10%, inert ingredients, qs.

Toxicity: Pine oil is closely related to, but less toxic than, turpentine. They are both products of steam distillation of pine wood and are later separated by fractional distillation, with the pine oil being less volatile. The estimated mean lethal dose for turpentine in adults is 4 to 6 oz; and 15 ml has been fatal to a child. The probable lethal oral dose for isopropyl alcohol in adults is 8 oz. The chlorophenol contained in this product would have similar toxicity to phenol but is less toxic. The lethal dose of phenol for adults is estimated at 8 to 15 gm orally, but the low concentration of chlorphenol in this product is unlikely to produce severe toxicity.

Symptoms and Findings: Irritation of mucous membranes, nausea, vomiting, and diarrhea Pine oil can cause transient excitement with later central nervous system depression and possible convulsions if large amounts are ingested. Phenolic-compound toxicity is not expected unless large amounts are ingested.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water. repeat in 20 minutes if necessary) or perform gastric lavage, if indicated by amount ingested. Give milk, saline cathartic, and force fluids Symptomatic and supportive treatment (see Isopropyl Alcohol, page 51).

References

National Clearinghouse for Poison Control Centers, Washington, D C., card file index.

Stecher, P G, ed The Merck Index: An Encyclopedia of Chemicals and Drugs, ed. 8 Rahway, New Jersey: Merck, 1968.

Placidyl (Ethchlorvynol)

Type of Product: Nonbarbiturate hypnotic.

Manufacturer: Abbott Laboratories, North Chicago, Illinois 60064.

Ingredients/Description: Supplied as capsules containing ethchlorvynol, 100, 200, 500, and 750 mg.

Toxicity: Single doses of 7.0 to 49.5 gm have been fatal. Doses of 7.5 to 60 gm have produced extended coma from which the patient recovered after several days.

Symptoms and Findings: Central nervous system depression which may seriously compromise ventilatory and circulatory function.

Treatment: If the patient is not comatose, initial therapy is emesis (Ipecac Syrup 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary). Prompt attention should be directed to establishing a clear airway and adequate ventilation. This aspect of therapy is crucial, often improving circulatory status as well as oxygenation of tissues. If hypotensive problems continue in spite of adequate ventilation and elevation of the foot of the bed, volume expansion is the therapy of choice. Peritoneal lavage or hemodialysis may be of some benefit in massive overdosage, but the efficacy of dialysis is probably low.

References

Abbott Laboratories, information from manufacturer.

Clemmesen, C, and Nilsson, E Therapeutic trends in the treatment of barbiturate poisoning The Scandinavian method Clin. Pharmacol. Ther., 2:220, 1961.

Mann, J. B., and Sandberg, D H.: Therapy of sedative overdosage Pediat. Clin. North Amer, 17.617, 1970.

National Clearinghouse for Poison Control Centers Washington, D.C., card file index

Preludin (Phenmetrazine)

Type of Product: Appetite suppressant.

Manufacturer: Geigy Pharmaceuticals, Ardsley, New York 10502.

Ingredients/Description: Tablets, 25 mg phenmetrazine, deep pink, square, flat-faced, odorless, bitter, single scored; stamped "Geigy."

Toxicity: Rats—LD_{50}, 318 mg/kg orally. No deaths from overdose. A 5-year-old child ingested 12 tablets; unknown amount removed by gastric lavage; no symptoms. A 2½-year-old child ingested up to 15 tablets; unknown amount removed by emesis; nervousness and excitation occurred; uneventful recovery. Maximum recommended adult dose is three tablets (75 mg) daily.

Symptoms and Findings: Nervousness, excitation, exhilaration, insomnia, restlessness, agitation, convulsions.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Use chlorpromazine as antidote. See Amphetamine (page 6) for full details.

References

Geigy Pharmaceuticals, Medical Department, information from manufacturer.

Gleason, M N, Gosselin, R. E, Hodge, H C., and Smith, R P · Clinical Toxicology of Commercial Products Acute Poisoning, ed 3 Baltimore: Williams and Wilkins, 1969

Salicylates

(Aspirin, Sodium Salicylate, Methyl Salicylate)

Type of Product: Analgesic, antipyretic, anti-inflammatory agent.

Manufacturer: Various.

Ingredients/Description: Aspirin is supplied in tablets of 75, 300, and 600 mg. Sodium salicylate is supplied as tablets of 300 mg. Both are found in cold and analgesic mixtures dispensed in tablet, capsule, powder, and liquid forms. Methyl salicylate is available as oil of wintergreen and as an ingredient of analgesic ointments.

Toxicity: Toxic dose of sodium salicylate and aspirin is 150 to 200 mg/kg. The mean lethal dose for adults is probably 20 to

30 gm. Methyl salicylate has been fatal to children in 4 ml doses.

Symptoms and Findings: Salicylates, by way of central nervous system stimulation, cause hyperpnea; there is CO_2 loss and respiratory alkalosis. Young children promptly develop a ketosis resulting in a metabolic acidosis superimposed on the respiratory alkalosis. In adults, alkalosis commonly persists until the stage of terminal respiratory failure. After an asymptomatic period, symptoms are hyperpnea, vomiting, headache, tinnitus, irritability, restlessness, delirium, hallucination, confusion, mania, convulsions, coma. Sweating, fever, and dehydration are likely to occur. Death results from respiratory failure, cardiovascular collapse, or complications of electrolyte imbalance.

Treatment: For excessive ingestion, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. After evacuation of the stomach, administer activated charcoal. Obtain blood for salicylate level, pH, pCO_2, bicarbonate, sodium, potassium, chloride, and glucose. Done's nomogram (see Fig. 1) may assist in evaluating severity of intoxication when salicylate was ingested in a single dose. Give fluids, electrolytes, and glucose as required to correct dehydration, acidosis, and hypoglycemia. If patient is in shock, give blood plasma or albumin (10 to 15 ml/kg) immediately. Children less than 4 years old with serious poisoning are usually acidotic on admission to the hospital. Sodium bicarbonate may be given for acidosis either by adding it to the intravenous fluids in a concentration of 15 mEq/liter or in individual intravenous doses (3 to 5 mEq/kg) over a 2- to 4-hour period and repeated cautiously as indicated by response. In children more than 4 years old, the serum bicarbonate concentration may be low but the pH of the blood normal or high (alkalotic) This is caused by stimulation of the respiratory center and a resultant respiratory alkalosis superimposed on a metabolic acidosis. In such a situation, bicarbonate must be administered more cautiously. Acetazolamide (Diamox) may be used in a dose of 5 mg/kg/24 hours. The aim of bicarbonate therapy is to maintain the blood pH within the normal range and the urine pH above 7.5. In severe acidosis, large amounts of sodium bicarbonate may fail to correct the acid-base balance. When urine output is adequate, add KCl to intravenous fluids in concentration of 30 to 35 mEq/liter. The usual fluid requirement during the period of severe symptoms is 2.3 to 4.0 liters/M^2 per day. Tetany should be

treated by cessation of alkali therapy and intravenous administration of calcium gluconate. Respiratory depression may require artificial ventilation and oxygen. Vitamin K_1 oxide may be given in doses of 15 mg, intravenously, to prevent hypoprothrombinemia.

The use of dialysis (extracorporal or peritoneal) or exchange transfusion may be indicated in patients with persistently high salicylate levels (above the "severe" line on the nomogram). Peritoneal dialysis fluid should contain 5% albumin and electrolyte equivalent to normal plasma values. The use of acetazolamide in infants is controversial and can make the acidosis more profound. Treat fever by sponging and the use of an ice mattress.

In the treatment of chronic aspirin poisoning, central nervous system symptoms may resolve more slowly than acid-base derangement.

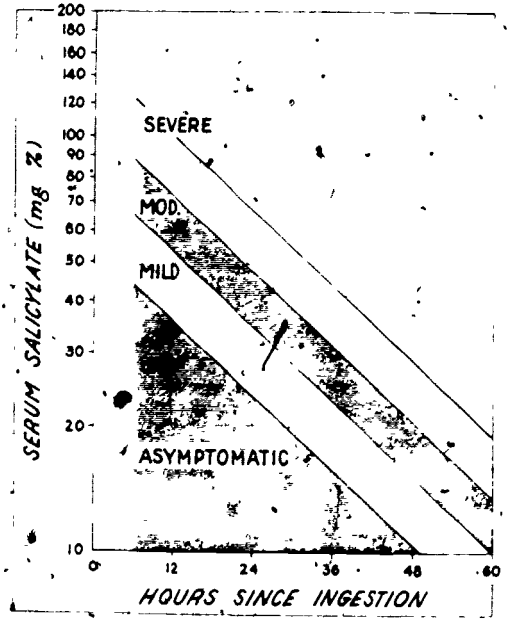

Figure 1. Nomogram relating serum salicylate concentration and expected severity of intoxication at varying intervals following the ingestion of a single dose of salicylate. (From Done, A. K.: Salicylate intoxication: Significance of Measurements of salicylate in blood in cases of acute ingestion. Pediatrics, 26:800, 1960.)

References

Done, A. K · Salicylate intoxication. Significance of measurements of salicylate in blood in cases of acute ingestion. PEDIATRICS, 26·800, 1960

Done, A. K., and Temple, A. R.: Treatment of salicylate poisoning Mod. Treat., 8.528, 1971.

Hill, J B Salicylate intoxication. New Eng J. Med , 288:1110, 1973.

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Pierce, A. W , Jr : Salicylate poisoning PEDIATRICS, 54:342, 1974.

Serax (Oxazepam)

Type of Product: Sedative, minor tranquilizer.

Manufacturer: Wyeth Laboratories, P.O. Box 8699, Philadelphia, Pennsylvania 19101.

Ingredients/Description: Supplied as tablets containing: oxazepam, 10, 15, and 30 mg.

Toxicity: Toxicity is relatively low. The acute LD_{50} in mice is greater than 5,000 mg/kg compared to 800 mg/kg for chlordiazepoxide (Librium). Withdrawal symptoms, including seizures, have been reported after prolonged use of large doses.

Symptoms and Findings: Drowsiness, dizziness, ataxia, and dysarthria are most common. Respiratory activity is not usually impaired except in massive suicide attempts with mixtures of other drugs. Similar to chloridiazepoxide.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Activated charcoal may be given but is of questionable efficacy. Other treatment is supportive. Dialysis of oxazepam alone is of little value.

References

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index.

Wyeth Laboratories, information from manufacturer.

Sinequan (Doxepin)

Type of Product: Tricyclic antidepressant.

Manufacturer: Pfizer Laboratories, 235 E. 42nd Street, New York, New York 10017.

Ingredients/Description: Doxepin hydrochloride in capsules of 10 mg, 25 mg, and 50 mg. Doxepin hydrochloride is a dibenzoxepin tricyclic compound with a chemical structure similar to that of imipramine (Tofranil) and amitriptyline (Elavil). It is well absorbed and rapidly metabolized after oral administration. Doxepin should not be administered concomitantly with MAO inhibitors. It also potentiates the action of barbiturates and alcohol.

Toxicity: An adult ingested 626 to 1,250 mg and exhibited only lethargy; but, a woman who took 1,500 mg had severe respiratory depression, seizures, and ventricular tachycardia. A 5-year-old child ingested 19 capsules of unstated strength (at least 190 mg) and exhibited lethargy and extrapyramidal symptoms. A dose of 2,350 mg in combination with possibly both Artane and Mellaril was fatal to an adult human.

Symptoms and Findings: The most serious symptoms come soon after ingestion, often within 1½ to 3 hours. Survival to 12 to 24 hours usually is associated with the abatement of all symptoms, although ECG signs indicative of conduction defects may last for several days.

Cardiac, central nervous system, and electrolyte effects are the most important. Palpitations and tachycardia may be followed by arrhythmias, cardiac failure, and hypertension; later, hypotension, ventricular tachycardia, and fibrillation may occur. Central nervous system findings may include dizziness, hallucinations, sedation, agitation, seizures, and coma. Hypokalemia and metabolic acidosis may occur. Atropine-like actions include dry mouth, blurred vision, urinary retention, and constipation. ECG findings include supraventricular tachycardia at lower doses, and widening of the QRS, depression of the S–T segment, and abnormal T waves, which may persist beyond other signs and symptoms. Ventricular tachycardia, flutter and fibrillation, wandering pacemaker, multifocal extrasystoles, and atrioventricular and intraventricular blocks are found in severe and potentially lethal poisoning.

Treatment: If the patient is not convulsing and has normal blood pressure and ECG, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) and administer activated charcoal. All patients should be observed in the hospital with frequent ECG monitoring. Seizures may be controlled with diazepam (0.05 to 0.1 mg/kg, IV). Phenytoin may be helpful for both seizures and arrhythmias in a dose of 5 mg/kg given intravenously at a rate not to exceed 0.5 mg/kg/minute. Defibrillator should

be available, although results in ventricular tachycardia and flutter have not always been satisfactory. Slow intravenous propranolol (Inderal, 0.05 to 0.1 mg/kg/dose) has been used successfully. Parasympthomimetic drugs have been effective in some arrhythmias.

Physostigmine salicylate is an antidote for severe intoxication from drugs with anticholinergic action such as doxepin. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly, repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed, and the patient's symptoms may return within 1 to 2 hours. Although neostigmine methylsulfate is not effective in reversing the central nervous system toxic manifestations of the tricyclic antidepressants, it may be effective in controlling the cardiac arrhythmia. The dose of neostigmine methylsulfate is similar to that of physostigmine salicylate. Isoproterenol and levarterenol should be avoided. Blood and plasma expanders may be necessary. Respiration may require mechanical support. Dialysis and diuresis appear to offer little benefit. Continuous gastric lavage may be useful but should be performed in the older comatose patient only after insertion of a cuffed endotracheal tube. Electrolytes should be monitored, acidosis should be treated with $NaHCO_3$, and hypokalemia should be treated with potassium. Sudden relapse may occur after successful therapy, so vigilance for 24 or more hours is indicated.

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National Clearinghouse for Poison Control Centers, Washington, D.C., card file index

Nixon, D. D. Thrombocytopenia following doxepin treatment. J.A.M.A., 220:418, 1972

Roberts, R. J., Mueller, S., and Lauer, R. M. Propranolol in the treatment of cardiac arrhythmias associated with amitriptyline intoxication. J. Pediat., 82:65, 1973

Williams, J. O. Respiratory depression in tricyclic overdose. Brit. Med. J., 1:631, 1972

Sominex

Type of Product: Antihistaminic sedative.

Manufacturer: J. B. Williams Company, Pharmaceuticals Division, Cranford, New Jersey 07016.

Ingredients/Descriptions: See Table 11.

Note: In Canada, the formulation for Sominex is considerably different. It contains: ammonium bromide, 65.06 mg; potassium bromide, 146.35 mg, sodium bromide, 130.16 mg, acetaminophen, 168.25 mg

Toxicity: Methapyrilene hydrochloride, an antihistamine, has an estimated LD_{50} of 25 to 50 mg/kg; but, fatalities have been reported from doses of 10 mg/kg Scopolamine amineoxide HBr is estimated to be fatal for children at a dose as low as 10 mg, but recovery from 100 mg has been reported in an adult male.

Symptoms and Findings: Nausea, vomiting, drowsiness, diminished reflexes, disorientation, hypotension, delirium, central nervous system depression (with or without excitation and convulsions). Large doses cause dilated, fixed pupils and coma. Scopolamine has a greater tendency than atropine to cause central nervous system depression and dulling. But, it is similar in causing mydriasis; dry mouth, dry, hot, flushed skin, urinary retention; blurred vision. Hypotension from salicylamide is of short duration so fluids may be all that is required.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Administer activated charcoal (5 to 25 gm) after evacuation of the stomach. Hypotension from salicylamide is of short duration so fluids may be all that is required. Treat convulsions with diazepam (0.05 to 0.1 mg/kg, IV). Antihistamines exert anticholinergic effects. Physostigmine salicylate is an antidote for severe intoxication from antihistamines and other anticholinergic drugs. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly; repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed and the patient's symptoms may return within 1 to 2 hours. Neostigmine is ineffective in reversing the effects of anticholinergic drugs on the central nervous system.

References

Dreisbach, R. H. Handbook of Poisoning: Diagnosis and Treatment, ed 8. Los Altos, California: Lange Medical Publishers, 1974

Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P. Clinical Toxicology of Commercial Products: Acute Poisoning, ed 3. Baltimore: Williams and Wilkins, 1969

TABLE 11
SOMINEX (U.S.) INGREDIENTS

Ingredient	Capsules	Tablets
Scopolamine amineoxide HBr	0.5 mg	0.25 mg
Methapyrilene HCl	50 mg	25 mg
Salicylamide	200 mg	200 mg

National Clearinghouse for Poison Control Centers, Washington, D.C., card file index
Slade, D A · Fatal poisoning in children from aspirin, quinine, and anthisan. Lancet, 2.809, 1952.

Talwin (Pentazocine)

Type of Product: Analgesic.

Manufacturer: Winthrop Laboratories, 90 Park Avenue, New York, New York 10016.

Ingredients/Description: Oral—Pentazocin hydrochloride, 50 mg tablets. Parenteral—Pentazocine lactate, 30 mg/cc of pentazocine; 1.0, 1.5, and 2.0 cc ampules and 10 cc multiple dose vials.

Toxicity: Similar to the narcotic analgesics. Addiction is less of a risk than with the other potent analgesics (opiates and meperidine), but may occur with prolonged use.

Symptoms and Findings: Nausea, vomiting, dizziness, lightheadedness, euphoria, visual hallucinations, respiratory depressions, and blurred vision. Seizures have rarely occurred. Some patients have developed severe ulcerations at the sites of injection.

Treatment: Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal saline. Administer activated charcoal. Respiratory supportive measures include oxygen, assisted ventilation, and vasopressors as indicated. Naloxone hydrochloride (0.01 mg/kg, IV) is the specific antidote and should be administered if there is severe respiratory depression. If respiration improves after the first injection but is not yet adequate, the dose should be repeated in 5 minutes and again in 10 minutes.

References

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National Clearinghouse for Poison Control Centers, Washington, D C., card file index.

Physicians' Desk Reference to Pharmaceutical Specialties and Biologicals, ed 29 Oradell, New Jersey. Medical Economics Company, 1975.

Testor Cements for Models

Type of Product: Adhesive cement.

Manufacturer: The Testor Corporation, Rockford, Illinois 61101.

Ingredients/Description: Testor Cement for Wood Models, Formula A, acetone 81%. Testor Cement for Wood Models, Formula B, toluene 25% and hexane 17%. Testor Cement for Plastic Models, toluene 71%.

Toxicity: Acetone has an oral LD_{50} of 5,300 mg/kg in rabbits and a threshold limit value (maximum safe air concentration) of 1,000 ppm in air (see Acetone, page 8). Toluene has an oral LD_{50} of 7,000 mg/kg in rats. Its lethal concentration is about 6,000 ppm in air for mice. Its threshold limit value is 200 ppm in air (see Toluene, page 94). Hexane has a lethal air concentration of about 40,000 ppm in air for mice. Its threshhold limit value is 500 ppm in air.

Symptoms and Findings: None expected when cement is used as directed. Children biting into tube or eating a small amount would not be expected to have symptoms. Inhalation of high concentration of these solvents (glue sniffing) may produce symptoms of central nervous system depression similar to alcohol intoxication. They can also produce an acute brain syndrome with elation, dizziness, floating sensation, confusion, slurred speech, delusion of superior strength or athletic ability, and visual hallucinations. The early phase lasts 45 to 60 minutes, depending on concentration, amount of solvent, and tolerance. High concentrations may product stupor, convulsions, and loss of consciousness. Chronic inhalation of high concentrations of these solvents may cause pulmonary, kidney, liver, or bone marrow damage.

Treatment: *Skin and eyes*—Wash with copious quantities of water.

Inhalation—Remove to fresh air and maintain respiration.

Ingestion—Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary)

or perform gastric lavage with normal saline. If large quantity were ingested, do not give epinephrine (danger of inducing ventricular fibrillation). Symptomatic and supportive otherwise.

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Thyroid, Dessicated

Type of Product: Hormone.

Manufacturer: Various.

Ingredients/Description: Dessicated thyroid is the dried, powdered thyroid gland previously deprived of connective tissue and fat; it is obtained from domesticated animals used for food by man. Tablets are made from the compressed powder in numerous sizes ranging from ¼ grain to 5 grains of thyroid.

Toxicity: Reports of accidental ingestion have shown that serious intoxications are rare. Doses of 2 to 3 gm of dessicated thyroid have been tolerated by infants, but one serious poisoning resulted from the ingestion of 3.2 gm by a 15-month-old child. Dessicated thyroid is potentially much more dangerous in patients with preexisting cardiac disease.

Symptoms and Findings: None expected following acute (single-dose) ingestions. Ingestion of large amounts may produce palpitations, tachycardia, rapid and irregular pulse, headache, tremors, nervousness, insomnia, delirium, diaphoresis, hyperpyrexia, vomiting, collapse, and coma.

Treatment: Emptying of the stomach is probably unnecessary after a single-dose ingestion, although inducing of emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or performing gastric lavage with normal saline should be considered if a large amount is ingested.

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Tofranil (Imipramine)

Type of Product: Tricyclic antidepressant.

Manufacturer: Geigy Pharmaceuticals, Ardsley, New York 10502.

Ingredients/Description: Supplied as tablets—imipramine hydrochloride, 10, 25, and 50 mg; capsules—impramine, 75, 100, 125, and 150 mg. The amount of the pamoate salt is adjusted so the contents are equivalent to the stated amount of imipramine hydrochloride.

Toxicity: Imipramine has an oral LD_{50} in rats of 682 mg/kg. In man, doses above 10 to 20 mg/kg are toxic. In clinical overdosage, adults have survived doses up to 5,375 mg, and a 1½-year-old child survived a dose of 375 to 500 mg. Deaths have occurred in adults with doses as low as 625 mg. A 2-year-old child had cardiac arrest after ingesting 250 mg (23 mg/kg) Deaths have occurred at therapeutic doses when combined with monoamine oxidase inhibitors. Children seem more prone to toxicity. Tolerant adults are more protected. Imipramine sensitizes the myocardium to cathecholamines.

Symptoms and Findings: The most serious symptoms come soon after ingestion, often within 1½ to 2 hours. Survival to 12 to 24 hours usually is associated with the abatement of all symptoms, although ECG signs indicative of conduction defects may last for several days.

Cardiac, central nervous system, and electrolyte effects are the most important. Palpitations and tachycardia may be followed by arrhythmias, cardiac failure, and hypertension; later, hypotension, ventricular tachycardia, and fibrillation may occur. Central nervous system findings may include dizziness, hallucinations, sedation, agitation, seizures, and coma Hypokalemia and metabolic acidosis may occur. Atropine-like actions include dry mouth, blurred vision, urinary retention, and constipation. ECG findings include supraventricular tachycardia at lower doses, widening of the QRS, depression of the S–T segment, and abnormal T waves, which may persist beyond other signs and symptoms. Ventricular tachycardia, flutter and fibrillation, wandering pacemaker, multifocal extrasystoles, and atrioventricular and intraventri-

cular blocks are found in severe and potentially lethal poisoning.

Treatment: If the patient is not convulsing and has normal blood pressure and ECG, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) and administer activated charcoal. All patients should be observed in the hospital with frequent ECG monitoring. Seizures may be controlled with diazepam (0.05 to 0.1 mg/kg, IV). Phenytoin may be helpful for both seizures and arrhythmias in a dose of 5 mg/kg given intravenously at a rate not to exceed 0.5 mg/kg/minute. Defibrillator should be available, although results in ventricular tachycardia and flutter have not always been satisfactory. Slow intravenous propranolol (Inderal, 0.05 to 0.1 mg/kg/dose) has been used successfully. Parasympathomimetic drugs have been effective in some arrhythmias.

Physostigmine salicylate is an antidote for severe intoxication from drugs with anticholinergic action such as imipramine. Physostigmine salicylate dose in children: start with 0.5 mg, IV, slowly, repeat this dose at 5-minute intervals until reversal of toxic effects or a maximum of 2 mg is attained. Adults may receive up to 4 mg in divided doses over 20 to 30 minutes. NOTE: physostigmine is rapidly destroyed, and the patient's symptoms may return within 1 to 2 hours. Although neostigmine methylsulfate is not effective in reversing the central nervous system toxic manifestations of the tricyclic antidepressants, it may be effective in controlling the cardiac arrhythmia. The dose of neostigmine methysulfate is similar to that of physostigmine salicylate. Isoproterenol and levarterenol should be avoided. Blood and plasma expanders may be necessary. Respiration may require mechanical support. Dialysis and diuresis appear to offer little benefit. Continuous gastric lavage may be useful but should be performed in the older comatose patient only after insertion of a cuffed endotracheal tube. Electrolytes should be monitored; acidosis should be treated with $NaHCO_3$, and hypokalemia should be treated with potassium. Sudden relapse may occur after successful therapy, so vigilance for 24 or more hours is indicated.

References

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Toluene

(Toluol, Methylbenzene, Methylbenzol, Phenylmethane)

Type of Product: Solvent, fuel.

Manufacturer: Various.

Ingredients/Description: Toluene is a colorless, flammable liquid with a benzene-like odor. It is used in aviation gasoline; as a solvent for resins, gums, oils, lacquers; and in the manufacture of various organic compounds.

Toxicity: Toluene has greater acute toxicity than benzene. It is readily absorbed in inhalation and ingestion. Exposure to vapors at 600 to 800 ppm for 3 to 8 hours produced central nervous system stimulation followed by depression similar to alcohol intoxication. The threshold limit value (maximum safe air concentration) is about 200 ppm. Aspiration of small amounts may be fatal. Toluene is rapidly metabolized and excreted as hippuric acid in the urine and unchanged in the exhaled air.

Symptoms and Findings: Toluene is an irritant to skin, mucous membranes, and eyes. Contact with liquid toluene may cause erythema and blisters of the skin, and inflammatory lesions of mucous membranes. Eye contact results in burns of varying degrees of severity. Systemic symptoms include central nervous system stimulation followed by depression similar to alcohol intoxication with extreme, mental confusion, exhiliration, nausea, headache, vertigo, mydriasis, impaired accommodation to light, muscular incoordination, staggering gait. After effects of insomnia; severe nervousness, nausea, and muscular fatigue persist for days. Unlike benzene, this chemical does not usually affect hemopoietic tissue and does not act as a convulsant neurotoxin. Sustained exposure to high concentrations may cause narcosis and fatal respiratory paralysis. Chronic inhalation of a high concentration produces varying degrees of fatigue, nervousness, insomnia, anorexia, hepatomeglia, and pronounced intolerance to alcohol. Renal tubule damage has been observed in rats.

Treatment: *Inhalation*—Remove from exposure, keep victim at complete rest, and maintain respiration (support respiration, give oxygen). Do not give epinephrine (danger of ventricular fibrillation).

Skin—Wash thoroughly with soap and water.

Eyes—Flush thoroughly with water for 15 minutes. Consult ophthalmologist.

Ingestion—Induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary) or perform gastric lavage with normal saline If large quantity ingested, do not give epinephrine (danger of inducing ventricular fibrillation). Symptomatic and supportive otherwise.

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Patty, F A, ed Industrial Hygiene and Toxicology, Vol II, ed 2 New York Interscience Publishers, pp 1226-1229, 1962

Turpentine (Oil of Turpentine, Gum Turpentine)

Type of Product: Paint solvent.

Manufacturer: Various.

Ingredients/Description: Aromatic oil extracted from pine wood by steam distillation and separated from pine oil by fractional distillation Supplied both pure and as an ingredient in stains and paints.

Toxicity: Ingestion of as little as 15 ml has been fatal to children, although the estimated mean lethal dose for adults is 4 to 6 oz

Symptoms and Findings: Abdominal pain, nausea, vomiting, diarrhea, transient excitement, delirium, ataxia, and stupor. Convulsions may occur occasionally—usually not until several hours after ingestion, when they may interrupt a deep coma. Albumunuria, hematuria, and anuria can occur. Fever and tachycardia are common. Chemical pneumonia can occur from aspiration.

Treatment: Similar to the petroleum distillates. Because turpentine is a strong central nervous system depressant as well as being able to cause irreversible renal damage and chemical pneumonia, it should be removed from the stomach. If the patient is alert, induce emesis (Ipecac Syrup, 15 ml, PO, followed by 1 cup of water, repeat in 20 minutes if necessary). Newer information suggests that Ipecac Syrup-induced vomiting creates no greater danger of aspiration than lavage in the alert patient. Some physicians may wish to continue to follow the practice of lavage rather than emesis.

Gastric lavage should be performed if the patient is stuporous. During this procedure, a snug-fitting endotracheal tube should be inserted to prevent aspiration pneumonitis. Special problems include treatment of pulmonary edema, anuria, control of convulsions, and respiratory failure.

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Valium (Diazepam)

Type of Product: Sedative, minor tranquilizer.

Manufacturer: Roche Laboratories, Division of Hoffman-LaRoche Inc., Nutley, New Jersey 07110.

Ingredients/Description: Supplied as tablets containing diazepam 2 mg (white), 5 mg (yellow), 10 mg (light blue).

Toxicity: Toxicity is relatively low, but greater than that of meprobamate. Central nervous system depression (drowsiness and lethargy) usually seen. Diazepam has an oral LD_{50} of 720 mg/kg in mice. Adults receiving 75 mg per day exhibited fatigue, drowsiness, and ataxia. A young adult became semicomatose and cyanotic 3 hours after ingestion of 125 mg. An unsuccessful suicide was attempted with 2.25 gm. No autonomic blocking action. Action is potentiated by other central nervous system depressants, psychotropic drugs, and alcohol.

Symptoms and Findings: Drowsiness, fatigue, ataxia, vertigo. Central nervous system depression symptoms include slurred speech, incoordination, hypotension, stupor, coma, and cyanosis. Other symptoms occurring occasionally include nausea, vomiting, tinnitus, blurred vision, irritability, hyperexcitability, tremor, uncooperatveness, hostility, acute rage, crying, and hallucinations. Agranulocytosis is possible.

Treatment: Include emesis unless comatose or convulsion (Ipecac Syrup; 15 ml, PO, followed by 1 cup of water; repeat in 20 minutes if necessary) or perform gastric lavage with normal

saline. Give charcoal. Support respiration, give oxygen. Levarterenol drip for severe hypotension. Symptomatic and supportive. Dialysis is of no value.

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Although preference was given to use of the generic name for each drug, the trade name was sometimes used in addition to or instead of the generic name. Therefore, when looking for a specific drug, check for entries under both the generic and trade names.

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