EMERGENCIES IN GENERAL PRACTICE

POISONS CHILDREN SWALLOW

BY

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The pattern of accidental poisoning in childhood has changed considerably in recent years, as the comparison (see Table), based on the Registrar-General's returns, shows.

*Commoner Poisons Causing Death in Children Under 10 Years
England and Wales*

1931-5		1950-2	
Poison	No. of Deaths	Poison	No. of Deaths
Belladonna (vegetable and medicinal)	8	Ferrous sulphate	24
Caustic soda (? + "corrosive" 2)	7	Antihistamines	19
Strychnine	6	Aspirin	15
Disinfectants	5	Strychnine	12
Camphor	5	Lead	7
Ammonia	4	Oil of wintergreen (liniment of methyl salicylate B.P.C.)	6
Oil of wintergreen (liniment of methyl salicylate B.P.C.)	3	Digitalis	5
Digitalis	3	Barbiturates	5
Morphine	3	Caustic soda	3
Aspirin	3	Morphine	3
		Kerosene	3
		Methadone	2
		Phosphorus	2

The most frequent causes of poisoning encountered at two children's hospitals in recent years were barbiturates, kerosene, turpentine, ferrous sulphate, salicylates, and camphor. More recently still, the antihistamines and, to a lesser extent, methadone have come into the picture. A rough working classification of poisoning in childhood can thus be made:

Common and Dangerous.—Ferrous sulphate, antihistamines.

Moderately Common and Dangerous.—Caustic soda, aspirin, methadone.

Common, not very Dangerous.—Barbiturates, kerosene.

Uncommon, but Dangerous.—Strychnine, oil of wintergreen.

General Management

Time Factor.—If at all possible the practitioner should give his initial instructions to the parents by telephone. Parents rarely stimulate vomiting unless told to do so. Later the practitioner should warn the hospital of his patient's impending arrival.

Emetics.—Good and accessible emetics are salt (a rounded tablespoonful to a tumbler of water) and mustard (a level teaspoonful to the tumbler). The effect of a finger down the throat should not be forgotten. Apomorphine and ipecacuanha are uncertain in action, and the first is contraindicated in poisoning by depressants.

Gastric Lavage.—The practice of this manœuvre in a toddler merits special description. The child should be immobilized in a tightly folded blanket, fixed with safety-pins. He should lie with his head to the side, his mouth held open with a Doyen gag. When in doubt, use warm water for the lavage. The tube used should be at least size 18 French. The tip is better not lubricated, except in atropine poisoning, as many children seem to consider glycerin an added insult. If the tube is passed gently along the tongue, the child will usually swallow the tip. If he does not, the first gulp may be initiated by pinching his nose.

The tube is then passed down, the child being watched for cyanosis or coughing. The "funnel" (a 60-ml. receptacle with parallel sides) is held close to the ear, and the plop of escaping air can usually be heard as the tube enters the stomach. Should the tube enter the trachea, the extreme distress of the child will give ample warning. The funnel is then lowered below the level of the stomach, open end upwards, and fluid gastric contents may then appear in it. Lavage is carried out, using 50 ml. of fluid at a time, and continued until the returning fluid is clear as judged by both sight and smell. It is always advisable to hold the funnel upright when siphoning off, so that the "in-out" fluid balance can be roughly checked. The funnel should not be completely emptied, or an air-lock may form when it is being refilled. If the tube is pinched while emptying the funnel, any air-lock forming will be confined to the upper part of the tube and easily dealt with. If the child vomits during the lavage, as often happens, withdraw the tube at once and start again. After two or three vomits he often settles. Anyway, vomiting is of therapeutic value, and occasionally it will be possible to carry out efficient "lavage" by alternately stimulating vomiting and giving drinks by mouth.

Potassium permanganate added to the lavage fluid to form a dark pink solution destroys strychnine, nicotine, morphine, and phosphorus, but not atropine, which is inactivated by tannic acid.

"Universal antidote" may be used when the poison is unknown. A mixture is made of powdered charcoal (scrappings of burnt toast) 2 parts, magnesium oxide (milk of magnesia) 1 part, and tannic acid 1 part (or use tea for lavage). Two teaspoonfuls (7 ml.) of the mixture is suspended in a pint (0.6 litre) of water, and a little should be left in the stomach after lavage.

Sedation.—Convulsions occur most commonly with strychnine, antihistamine, camphor, atropine, hyoscyne, and amphetamine poisoning. The possibility of respiratory depression ensuing, either as a result of the convulsions or as a later toxic effect of the poison, must be considered before giving a sedative which might potentiate the depression. *If the physician's chief aim is to control an emergency temporarily, and not to effect an immediate cure, he will not go far wrong.* A short-acting barbiturate, repeated as necessary, is probably the safest drug. In an emergency, amylo-barbitone sodium can be given intravenously. It is available in ampoules of 125 mg., and one ampoule can be given to a toddler in the course of a few minutes. It may also be given intramuscularly. As a substitute paraldehyde can be given intramuscularly to a toddler in a dose of 1-2 ml. The drug is available in 5-ml. ampoules which keep for two years.

Individual Poisons

Only the more important poisons are discussed. Corrosive poisoning and poisoning by barbiturates and aspirin were dealt with in earlier articles in this series.* Emphasis is laid on the significance of early symptoms rather than on treatment in hospital. Many other poisons are discussed in the medical diaries. For ease of reference, the arrangement is alphabetical.

*"Corrosive Poisoning," by Dr. J. D. P. Graham (April 16, p. 962), and "Barbiturate and Aspirin Poisoning," by Dr. T. J. Thomson and Professor Stanley Alstead (April 23, p. 1022).

Amphetamine Group

The young child's tolerance for these drugs is good. He may show a highly excitable and tremulous state for, say, twelve hours without having a frank convulsion. Treatment is by emesis, lavage, and amylobarbitone sodium, which can be given by mouth unless convulsions occur.

Antihistamines

Antihistamine poisoning is dangerous. The younger the child the more susceptible he is to doses expressed per kilogram of body weight. A child of 15 months may well die after taking 0.4 g. of mepyramine maleate. The other antihistamines in common use are rather less dangerous in the forms in which they are commonly dispensed, but all are potentially lethal.

The symptoms usually begin with ataxia and confusion. Vomiting is often absent. In more severe cases a coarse muscle twitching supervenes, and then possibly one or more generalized convulsions. Signs of moisture in the lower respiratory tract, most commonly produced by mepyramine, signify that recovery is unlikely. Death usually occurs in respiratory depression. Symptoms of poisoning may appear within a few minutes of ingestion, or may be delayed for two hours and still prove fatal. The first convulsion may occur anything from a half to six hours after ingestion. The statement that the earlier symptoms appear the worse is the prognosis is only a broad generalization.

Emesis often fails, as the drug depresses the vomiting centre, and gastric lavage should be done without undue delay. No further treatment is indicated at that point. Should convulsions occur sedation may be used, but the occurrence of muscle twitching is not an absolute indication for sedation. When given, sedation should be light—for example, amylobarbitone sodium, 65 mg. intravenously, to ensure that the drug's action is as short as possible. It may be repeated as necessary, but the great danger of over-sedating a patient who is already heading for respiratory depression by the nature of the poison he has taken must be borne in mind. Paraldehyde, 1 ml. intramuscularly, can be used as a second choice. Oxygen should be given in the presence of cyanosis. Nikethamide does not seem to help the succeeding respiratory depression, but amphetamine sulphate, 5 mg. intramuscularly, is worth trying. Artificial respiration has been life-saving at times. Histamine should not be used.

Atropine Group

Plants responsible for producing atropine poisoning are deadly nightshade, woody nightshade (bittersweet), and henbane (*Hyoscyamus niger*). Medicinal atropine—for example, eye-drops—may also be ingested, and travel-sickness pills containing hyoscine are relatively common at present. The signs of dilated pupils, hot dry skin, thirst, and hallucinations are well known. Coarse muscle twitching and jactitations indicate more severe poisoning. It seems probable that if the child is not giving cause for acute anxiety within two hours of ingestion he will do well, but I have seen too few cases personally to offer this as a dogmatic assertion. The course may be protracted and mild mental symptoms may persist for 48 hours.

Initial treatment is by emesis and lavage. Pilocarpine nitrate, 1/24–1/12 gr. (2.7–5.4 mg.), repeated as necessary, can be given, but its limitations must be realized. It is not a specific antidote. It can abolish peripheral effects, but will not influence the central effects which are the cause of death. If the case is so severe as to warrant sedation, the patient needs constant supervision and is best treated in hospital.

Camphor

Camphor is usually taken as camphorated oil, being given in error by parents in 50% of cases. It is an alarming poison in that half the cases develop generalized convulsions, but the prognosis is good. Of the ten children with camphor

convulsions I have seen, all did well. One teaspoonful (3.5 ml.) of the oil is dangerous to a toddler. Vomiting may occur within five minutes of ingestion. If a patient takes 30 minutes or more to vomit he will almost certainly have absorbed enough camphor to have a convulsion. On the other hand, if a patient has not vomited when first seen it may mean only that he has taken a completely innocuous dose. Coarse muscular twitching may appear, and usually heralds a convulsion, although the twitching may die away without a convulsion occurring. If death occurs it is usually in the depression following status epilepticus, but it may occur in primary respiratory failure.

The child should be made to vomit. Gastric lavage is indicated in most cases, but not if the child is twitching and a hospital is near. Paraldehyde, 1 ml. intramuscularly, is adequate for most cases showing convulsions. However, a second convulsion cannot be viewed with equanimity, and such a patient should be referred to hospital, where the physician may have to walk a therapeutic tightrope between status epilepticus and respiratory depression. Nikethamide is best avoided in such depression, as it is chemically akin to camphor itself.

Digitalis

The child poisoned by digitalis, which he obtains as pills or medicines prescribed for adults, may show nausea, vomiting, and bradycardia two to six hours after ingestion; atypically he may become comatose without heart signs. Emesis and gastric lavage are indicated, but no specific therapy should be attempted except in the presence of complications—for example, ventricular tachycardia. In this instance quinidine sulphate, 1–2 gr. (65–130 mg.), should be given, and repeated every two to three hours.

Ferrous Sulphate

Cases of ferrous sulphate poisoning should be referred to hospital, as intravenous therapy may suddenly become necessary to save the child's life. In a case of sudden severe vomiting with rapid prostration the possibility of iron poisoning should be considered.

It is impossible to name a toxic dose of ferrous sulphate. One child I know of took 120 gr. (8 g.) and soon after vomited the partly digested but recognizable remains of tablets equivalent to 108 gr. (7.2 g.), coming to no harm. All of 23 cases known to me vomited, beginning 10 to 90 minutes after ingestion. The child then becomes pale and sleepy, and shock may occur early if vomiting has been severe, on account of the corrosive action of the poison. Recovery after this stage is usual, but in the more serious cases secondary shock due to the toxic products of absorbed iron may appear about a day after ingestion, and may prove fatal. The eventual severity of the case is not related to the time of onset of the vomiting, but it does seem to relate to the severity of the early symptoms.

Immediate emesis is necessary, and is of more value than lavage if large tablets which are slow to dissolve have been taken. In lavage, sodium bicarbonate—a teaspoonful (3.5 ml.) to the pint (0.6 litre)—is used. Bismuth carbonate, 3 gr. (0.2 g.), is given four-hourly.

Kerosene, Turpentine Substitute, Petrol

The ingestion of kerosene, turpentine substitute, or petrol is usually associated with coughing and choking, and in almost half the cases radiological signs of bronchopneumonia appear. These changes, which may be present within an hour of ingestion, are probably produced by direct aspiration. The onset of symptoms is rapid, with nausea, vomiting, and drowsiness. The last is short-lived, and in two to three hours the patient is alert. The more severe cases develop dyspnoea, cyanosis (in which methaemoglobinemia may play a part), and a temperature of about 103° F. (39.4° C.). This happens within 36 hours of ingestion. Clinically there may be little to hear in the chest, in spite of definite radiological changes. The most severe form, with toxic changes in the heart, liver, and kidneys, is rare.

Emesis is better not attempted, and the practitioner should avoid doing lavage, if he can get his patient to hospital within an hour or two. The risk of inhalation during vomiting or lavage carried out in an adverse environment outweighs the risk of absorption from the gut. Antibiotics should be given prophylactically against secondary infection in the lungs. Mild cases can be nursed at home and allowed up as their general state warrants, without immediate recourse to radiological examination, but an x-ray picture is advisable before closing the case. Complications such as pneumothorax and mediastinal emphysema occasionally occur, and if the patient needs oxygen he is better admitted to hospital.

Lead

Lead-poisoning may result from the burning of battery casings or the drinking of contaminated water, but is usually caused by the ingestion of paint. Old paint is most apt to be dangerous, as the use of lead in paint in recent years has diminished as it is so costly.

It may be weeks or months before the symptoms appear, and often the diagnosis is only made *post mortem*. A history of ataxia, cerebral symptoms, abdominal pain, constipation, and weight loss in a child who shows perverted appetite should arouse suspicion. Confirmation may be found in stippling of red cells, condensation lines in the bones, excess lead in the urine, and renal glycosuria. An exacerbation may be caused by an unrelated metabolic upset. Specific treatment is best carried out in hospital.

Methadone and the Morphine Group

Methadone may be taken as tablets or the elixir. The child may be symptom-free for an hour or two after ingestion, even of the elixir, and then develop symptoms, initially drowsiness, which may prove fatal. Delay in treatment may be due to the failure of the parents to realize the seriousness of the situation, as they are usually much less alarmed by drowsiness than by vomiting.

Emetics should be given and the stomach washed out. If symptoms are present, nikethamide, 1 ml. intramuscularly or intravenously, depending on severity, or nalorphine, 2.5-5 mg. subcutaneously or by slow intravenous injection, should be given and the child referred to hospital.

Methyl Salicylate (Oil of Wintergreen)

The symptoms produced by this poison are those of salicylism; they call for the same treatment as aspirin poisoning. One teaspoonful (3.5 ml.) of oil of wintergreen yields 45 gr. (3 g.) of salicylate, and is virtually certain to be fatal to a toddler. An added danger is that there may be a silent period of five to six hours in which the child appears normal. Thereafter the only sign of impending trouble may be the almost imperceptible appearance of air-hunger respiration. Emesis and lavage are essential. All cases must be referred to hospital.

Phosphorus and Rat-poison

The common source of phosphorus is no longer matches but certain rat-poisons and fireworks. After ingestion, there is vomiting, often of altered blood, severe abdominal pain, and possibly a smell of garlic in the breath. Severe complications, such as liver damage and acidosis, may occur. If purgation occurs the stools may be phosphorescent in the dark. Potassium permanganate oxidizes phosphorus to harmless phosphoric acid. If copper sulphate is obtainable, 10 gr. (0.65 g.) in half a glass of water is a good emetic, serving also to coat the phosphorus. Severe cases should be sent to hospital.

Both arsenic and phosphorus have been used in the past as rat-poisons. Recently certain health authorities have been issuing dicoumarol mixed in bran. Such a case of poisoning should be referred to hospital. If bleeding occurs the ideal remedy is the natural form of vitamin K, 100 mg. given intravenously in 10 minutes. The vitamin K analogues are not so effective, but could be given in a dose of 20 mg. intramuscularly if the natural vitamin is not available.

Strychnine

It is unfortunate that since the early 1940's the Registrar-General's returns have not quoted the source of the strychnine which has caused fatal poisoning. Before that time the commonest source was Easton's tablets (tablets of ferrous phosphate with quinine and strychnine), but it is doubtful if that is the commonest cause now. Compound purgative tablets have proved much the commonest cause of strychnine poisoning in America and Canada, and compound aloes pills must be suspect in this country.

The first symptoms—muscular irritability and stiffness of the back and neck muscles—appear within a few minutes to an hour of ingestion. Generalized convulsions quickly supervene, usually within the first three hours if they are going to occur; rarely, they may be delayed. The opisthotonic convulsion, in which consciousness is maintained and pain is suffered, needs no description. It may be differentiated from tetanus by the sudden history and the relaxation of the jaw between convulsions. Rarely, strychnine convulsions are atypical and simulate simple convulsions of infancy.

Emesis and gastric lavage with potassium permanganate should be done if the child has only recently swallowed the poison and if it was taken in pill form. But if the drug was in fluid form, or if a large dose has been taken in any form, lavage is better delayed until sedation has been obtained, otherwise a fatal convulsion may be precipitated. If other sedatives (amylobarbitone sodium or paraldehyde) are unobtainable, fairly light anaesthesia may be used. The child should also be catheterized during barbiturate sleep, for if the urine is alkaline the strychnine salt liberates the free base, which may then be reabsorbed. This is also true of other alkaloids.

In poisoning by compound purgative pills, belladonna poisoning may coexist with strychnine poisoning, and the skin may be flushed and the pupils dilated between attacks. However, treatment should be directed at the strychnine, amylobarbitone sodium being repeated as often as necessary.

Next article on Emergencies in General Practice.—
"Some Common Mishaps," by Mr. Norman C. Lake.

Refresher Course Book.—Copies of the second volume of collected articles from the Refresher Course for General Practitioners are still available at 25s. (postage 1s.) each. The first volume is now sold out.

Clinical Pathology Book.—"Clinical Pathology in General Practice," a collection of 39 articles on clinical pathology that appeared in the *Journal* as part of the Refresher Course for General Practitioners, is now available, price 21s. (postage 9d.).

Both these volumes are obtainable from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1, or through any bookseller.

The Food and Drug Administration of America recently issued a statement about labelling drug preparations containing salicylates. The Administration points out that these preparations are frequently regarded by the public as harmless, and that ingestion of excessive quantities has been fatal in an average of a hundred children and adults annually. The labels on all packages of salicylates should be labelled with clear directions for use, and such statement as "Warning—keep out of the reach of children." Instead of a specific dosage for children under 3 the label should read, "For children under 3 years of age, consult your physician." These rulings have been based on the recommendation of a medical advisory panel consisting of paediatricians and representatives of the drug industry. Six months is allowed for modification of present labelling to comply with this ruling.