ABC of Poisoning

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PROBLEMS IN CHILDREN

Agents suspected as causes of poisoning in children aged under 5 years. Cases referred to the National Poisons Information Service 1983

Agents	No. of cases	%
Household	5976	47
Drugs	5103	40
Plants and animals	1276	10
Agrochemicals	197	1.5
Other chemicals	63	0.5
Miscellaneous (mainly suspected poisoning where none identified)	117	1.0
Total	12 732	100

Adults: Total enquiries 1983 = 35 000

Poisoning and suspected poisoning in childhood are common and represent over half the cases referred to the National Poisons Information Service. In the great majority of these cases the children are not at risk because the exposure did not involve a toxic dose or because the incident was a "scare" and, in truth, no exposure occurred. Initial management must, therefore, aim primarily at assessing the risk and identifying the less common but potentially more hazardous forms of poisoning which are found in children.

Assessment of accidental poisoning

The incident may appear dramatic but the risk is often small. This "paint" is "non-toxic".

Household products involved in 1452 cases of suspected poisoning reported to NPIS

(10% of enquiries referred to mixed exposure of liquids and solids adults, eg from lavatory cleaners)

Parents are well aware that the inquisitive nature of under 5 year olds can lead to them ingesting all kinds of substances, and most, quite naturally, overestimate the toxic hazards. Thus, when after an unguarded moment the child is found playing with a household chemical or other product, particularly when the product has clearly been opened, the reaction is usually to fear the worst. Liquids are more likely to be spilt and to present a dramatic picture. For the most part, such a reaction is not to be discouraged since it usually provides the doctor with an *early* chance to assess the risk. Careful history taking should help identify the poison, and particular attention must be given to the estimated time of exposure and dose. Bottles, containers, the substance itself (including plants or fungi), and any vomitus or urine should be saved for possible identification. Initially, one must accept the largest estimated dose and act accordingly (one swallow for a 3 year old is about 4-5 ml).

Examination may show evidence of the agent on the skin or clothing. The lips and mouth should be carefully inspected for burns or discoloration. The vomitus may have a characteristic colour or smell which may also be detected on the breath. In patients with symptoms the differential diagnosis with other acute illnesses must also be considered carefully. Against this background, the advice of a poisons information service can often help to separate those patients who can be returned home from those for whom admission is required.

(From Goulding R, Ashforth GK, Jenkins H. *Br Med J* 1978 ;i:286-7)

Treatment

Symptoms and treatment in suspected poisoning from household products

70-80% of cases aged < 5 years; over 60% asymptomatic

Only 24% admitted to hospital

Treatment:

Demulcents	28%
Diluent	20%
Emetic	4%
Gastric aspirations and lavage	4%
Other	13%

Some patients received more than one treatment

From Edwards JN, Henkins HL, Volan GN
Human Toxicology 1982; 1: 403-9.

Active measures to remove absorbed poisons are rarely indicated

Most often, even when the child is admitted, careful observation is all that is required. Otherwise, supportive measures are paramount and specific measures for poisoning are few. Emptying the stomach should be considered if the child is suspected of having ingested a potentially dangerous substance. Emesis with syrup of ipecacuanha is by far the favoured procedure for it is highly effective (probably more so than lavage), generally short acting, and usually causes little distress to the child—who probably has plenty of previous experience of vomiting. Once vomiting has subsided, other oral treatments can be considered: fluids to correct or prevent dehydration, activated charcoal to adsorb any remaining poison, and antidotes or other drugs when appropriate.

Gastric aspiration and lavage in the conscious child is traumatic for all concerned and should be avoided if possible. It is useful, however, in the unconscious child, providing a cuffed endotracheal tube is in place to protect the lungs.

In children attempts to remove absorbed poisons by forced diuresis, dialysis, haemoperfusion, or even plasma exchange are seldom justified and for most poisons there are too few data on which to judge effectiveness. We suggest, firstly, that these methods should be used only in consultation with a clinical toxicologist, and, secondly, that any case so treated should be very fully documented and reported.

Common problems

The following points reflect the answers given by the National Poisons Information Service to common questions on the management of poisoning in children:

- (1) **What is the recommended observation period for the child who is well or who has only minimal symptoms from poisoning?**

Observations must always be tailored to the individual case, but as a general rule 12-24 hours is adequate—for example, allow 24 hours to detect aspiration pneumonia when white spirit has been swallowed.

- (2) **How long after ingestion should the use of syrup of ipecacuanha or gastric lavage be considered?**

Gastric lavage is of doubtful value more than four hours after ingestion of the poison. Later lavage in children should be considered when aspirin, tricyclic antidepressants, or other slowly absorbed poisons have been taken. Like gastric lavage, ipecacuanha is sometimes thought to be ineffective more than four hours after ingestion of the poison. But the lack of serious adverse effects from this treatment have led to its general acceptance up to six hours after ingestion.

- (3) **What are the correct doses for antidotes in children?**

For most antidotes weight related doses are calculated and it is important not to exceed these. Naloxone may be given in doses many times the recommended dose per kg for children without risk. In an emergency 0.2 mg can be given without calculating the dose in relation to body weight.

- (4) **When are toxicological tests needed in children? What are the minimum sample sizes needed?**

Toxicological investigations are indicated less often than in adults but may be useful in cases of suspected poisoning due to aspirin, paracetamol, methanol, ethylene glycol, iron, quinine, paraquat, and heavy metals. Screening tests may prove useful in some cases where unconsciousness or abnormal behaviour cannot otherwise be explained.

Drug administration may be a form of child abuse. Screening tests are needed to confirm or refute such suspicions and are essential evidence for care proceedings, etc.

Samples for toxicological analysis need not be large—as little as 1.5 ml plasma or as little as 10 ml of urine, gastric aspirate, or vomitus will suffice.

Paracetamol - containing elixirs / syrups for children

Each of these products contains 120 mg paracetamol per 5 ml

Calpol infant suspension (Wellcome)
Calpol Child's Pain Elixir (Cupal)
Febrilix (Boots)
Panadol Elixir (Winthrop)
Panaleve Elixir (Wigglesworth)
Paldesic (RP Drugs)
Panets Baby Syrup (Optrex)

Paracetamol elixir (BPC)
Placidex Syrup (de Witt)
Q-Parol Elixir (Cupal)
Salzone (Wallace)
Calpol 6 plus is intended for children over 6 years
and adults and contains 250 mg paracetamol per 5 ml.
It comes in a child resistant container

There are at least 11 other compound (cold cure) elixirs containing paracetamol with other drugs and intended for adults

- (5) **How does the risk of paracetamol poisoning in children compare with that in adults and what treatment is needed?**

Paediatric elixirs of paracetamol usually do not contain enough paracetamol to cause serious liver damage even if the child ingests the whole bottle. When a large dose is thought to have been ingested (over 150 mg/kg), however, the case should be taken seriously. Timed plasma concentrations should be taken and an antidote given. The antidote may be stopped once the paracetamol concentrations confirm that there is no risk of severe liver damage.

NB: Adult elixirs of paracetamol are potentially much more dangerous to children. Both oral methionine and intravenous *N*-acetyl cysteine may be used. Methionine is easier to use, cheaper, and appears to offer adequate protection in the small number of cases where full treatment is justified.

- (6) **When should blood samples be taken for toxicological analyses?**

After suspected accidental ingestion of poisons most children reach hospital within one to two hours. Blood samples for toxicological analyses collected at this time may, however, underestimate the risk since absorption is usually continuing. For most poisons, samples collected four to six hours after ingestion will provide a more accurate assessment of the dose taken and we would advise these times, especially if only one sample is being taken. Serial samples, including early ones, can help further in the assessment, and particular attention must be paid to cases where absorption may be delayed or prolonged, as in delayed sustained release drug formulations.

Delayed absorption from overdose of sustained release drug. Smooth curves of plasma salicylate and paracetamol levels in two children after overdoses of Safapryn. Note the delayed peak salicylate levels.

- (7) **How important is it to keep strictly to the recommendations on drug dosage for children?**

As with adult doses, there is a wide margin of safety for many drug doses in children. There are, however, plenty of examples where problems can arise. Both doctors and parents may be unaware of the proper dose for children, and errors in calculating doses do occur. Aspirin is the main offender and deaths from "therapeutic" doses still occur. Lomotil (diphenoxylate and atropine) can cause respiratory depression and arrest; it is not recommended for children aged less than 1 year. Merbentyl (dicyclomine) is not recommended for children under 6 weeks since it may cause respiratory difficulty and arrest. Some cough mixtures contain opioids, and doses over those recommended will cause opioid toxicity. When there is any doubt check the dose carefully before using the drug.

- (8) **Can a child be poisoned from the drug concentrations which occur in breast milk as the result of therapeutic drug usage by the mother?**

The physicochemical nature of most drugs ensures that they will be excreted to some extent in breast milk. In most cases the dose of drug received by the suckling infant will not be hazardous. Some drugs, however, particularly certain central nervous system depressants, can cause adverse effects in the infant. Before breast feeding starts or continues it is essential to check for safety, using appropriate sources of information.

Non-accidental poisoning in children

Case history

Patient: 4 month old girl

Past history: Two previous admissions in grade III-IV coma. One grand mal convulsion, witnessed in hospital. Comprehensive clinical and biochemical investigations established no diagnosis.

Third admission: grade IV coma with cardiorespiratory arrests. Parents' behaviour suspect

Toxicological analysis: Amylobarbitone 35mg/l

Outcome: Recovery. Court order

Administration of poisonous agents occasionally forms part of the pattern of non-accidental injury. Other signs of non-accidental injury may be present but poisoning can be the only manifestation and is usually strongly denied on challenge. Common modes of presentation are repeated episodes of drowsiness, floppiness, or apnoea. Vomiting, hallucinations, or convulsions may also occur depending on the substance administered. The agents may be any medication prescribed to the parents (usually opioids, benzodiazepines, or antidepressants) or other substances available in the home, particularly salt. The child usually recovers in hospital but further episodes may follow visits by a parent (usually the mother). The earliest possible samples of blood, urine, or vomit should be collected and saved for biochemical analysis to confirm the diagnosis.

Flanagan RJ, Huggett A, Saynor DA, Raper SM, Volans GN. Value of toxicological investigation in the diagnosis of acute drug poisoning in children. *Lancet* 1981;ii:685-6. Rogers D, Tripp J, Bentovim A, Robinson A, Berry D, Goulding R. Non-accidental poisoning: an extended syndrome of child abuse. *Br Med J* 1976;ii:793-6.

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Clinical curio: disappearing phantom limbs

All amputees and those who work with them know that a phantom limb is essential for the use of an artificial limb. Thus the disappearance of a phantom may be disastrous and its recovery a matter of urgency. Weir Mitchell describes how, with faradisation of the brachial plexus, a phantom hand, missing for 25 years, was "resurrected." A patient under my care has to "wake up" his phantom leg every morning by flexing the stump of the thigh towards him and then slapping it sharply five or six times until this peripheral stimulus revives the phantom.—O SACKS, professor of neurology, New York.

How soon after immunisation with triple vaccine is it safe to carry out tonsillectomy? Is there any evidence that removing the tonsils and adenoids reduces the body's defence capabilities against infection?

There is no evidence about performing tonsillectomy within a given period after immunisation with triple vaccine. Polio IgA antibody levels in the nasopharynx have been shown to fall three to eightfold after immunising children and sometimes disappear completely. Antibody levels are less if tonsillectomy has been carried out more than two years previously, but tonsillectomy itself is not followed by a change in serum IgA levels and new IgG polio virus antibody may appear in the nasopharynx of up to a third of children. The incidence of clinical infection after an adenotonsillectomy has to be compared with previous rates of illness in those undergoing the operation, with the decreased rate of respiratory disease with age, and with seasonal variations in incidence. In one prospective study of common respiratory illnesses in 230 children over four years, including 26 who had tonsillectomy during the study, the operation made no difference to the attack rates of common respiratory illnesses. The children in this particular study did have a slightly higher attack rate both before and after operation compared with that expected for age and the seasonally adjusted rate for the total group studied. Other studies have shown an increased rate of colds and bronchitis after tonsillectomy, but the most recent experience reports a reduction in frequency and severity of sore throats in a group of children who had had tonsillectomy for

severe and frequent recurrent sore throats.² Perhaps the most important pointer to a danger of infection is the report that tonsillectomy increases the relative risk for Hodgkin's disease by a factor of 2.7.³ This study is particularly noteworthy, since an infectious agent has been implicated in the aetiology of Hodgkin's disease.—KATHERINE SLOPER, research fellow in immunology, and CHARLES G D BROOK, consultant paediatrician, London.

¹ Ogra PL. Effect of tonsillectomy and adenoidectomy on nasopharyngeal antibody response to polio virus. *N Engl J Med* 1971;284:59-64.

² Paradise JL, Blueston CD, Bachman RZ, et al. Efficacy of tonsillectomy for recurrent throat infection in severely affected children. Results of parallel randomized and nonrandomized clinical trials. *N Engl J Med* 1984;310:674-83.

³ Vianna NJ, Lawrence CE, Davies TNP, et al. Tonsillectomy and childhood Hodgkin's disease. *Lancet* 1980;ii:338-9.

What is the Chinese restaurant syndrome and how are its manifestations mediated biochemically?

In 1968 it was discovered that several people had been afflicted with a stereotyped set of symptoms after eating in Chinese restaurants in New York. Soups were particularly likely to provoke the symptoms, and when the ingredients of the soup were tested one by one it was found that the culprit was monosodium glutamate. The usual symptoms are a burning sensation in the skin, a feeling of tightness or pressure on the cheeks, and a feeling of pressure over the precordium or sub-sternal area. The last may amount to pain and may mimic angina. It may even radiate to the axillae or neck. ECG changes, however, do not occur. Everyone is susceptible to monosodium glutamate, but the threshold dose to obtain symptoms, given by mouth, varies from 1.5 to 12 g. The burning sensation, which usually begins over the chest, may spread to the neck, shoulders, forearms, abdomen, and occasionally thighs, and may be reproduced in the arm by local intravenous injection with the arterial circulation occluded by an axillary cuff. This implies a peripheral action. The other symptoms are unexplained. Monosodium glutamate is widely used by the food industry to increase flavours and a single serving of a processed food often contains 1 g.—K W HEATON, reader in medicine, Bristol.

¹ Schaumburg HH, Byck R, Gerstl R, Mashman JH. Monosodium L-glutamate: its pharmacology and role in the Chinese restaurant syndrome. *Science* 1969; 163:826-8.