ACCIDENTAL POISONING OF YOUNG CHILDREN

BY

DOUGLAS SWINSCOW

(RECEIVED FOR PUBLICATION OCTOBER 8, 1952)

Deaths from violence constitute the largest single group of deaths to which children aged 1-4 fall victim. The accidental ingestion of poisonous substances is a small but important cause of these deaths. During the decade 1940-49 the Registrar General for England and Wales reported the deaths of 218 children aged 1-4 from accidental poisoning other than by toxic gases. An account of the substances causing these deaths seemed to be worth while, since they have not previously been recorded.

Fig. 1 illustrates how children aged 1-4 are particularly liable to death from accidental poisoning. (In this paper the phrase 'accidental poisoning' means poisoning by ingestion of toxic substances, and the deaths referred to are those given by the Registrar General under the heading 'Other Acute Accidental Poisoning (not by Gas)', International List No. 179). In Fig. 1 the broken line shows the annual average death rate at age groups (without distinction of sex) for 1931-39 and the continuous line the same for 1940-49. Though the death rate in 1940-49 appears to be higher at every age group than in 1931-39, the disparity may be wholly due to the differences in recording the statistics, since from 1940 onwards deaths from accidental poisoning on which coroners' open verdicts were given were assigned to this category instead of to a separate one.

A detailed analysis of the average annual death rates at age groups in the two sexes is given in Table 1 for the two periods of years 1931-39 and 1940-49.

It shows that the death rates of both males and females follow similar trends, and that the death rates of children up to the age of 5 are considerably greater for

TABLE 1
AVERAGE ANNUAL DEATH RATE PER MILLION FROM ACCIDENTAL POISONING AT AGE GROUPS, SEXES DISTINGUISHED, FOR 1931-39 AND 1940-49

Age in Years	1931-39			1940-49		
	Males	Females	Total	Males	Females	Total
Under 1	2.6	1.6	2.1	3.7	2.1	2.9
1-	6.1	4.7	5.4	9.9	7.5	8.7
5-	0.5	0.6	0.5	0.9	0.9	0.9
10-	0.5	0.1	0.3	0.6	0.4	0.5
15-	0.5	0.5	0.5	1.5	0.7	1.1
20-	1.3	0.9	1.1	3.0	1.8	2.2
25-	1.6	1.2	1.4	3.3	2.4	2.8
35-	2.2	2.1	2.2	3.7	3.3	3.5
45-	3.4	3.3	3.3	6.0	4.6	5.3
55-	4.9	3.1	4.0	4.7	5.2	4.9
65-	5.3	3.3	4.2	6.7	5.9	6.2
75-	6.8	6.0	6.3	7.6	6.0	6.6

boys than for girls. The disparity between the sexes is greater for these death rates than it is for the death rates calculated from all other deaths combined. The ratios of male death rates as a

FIG. 1.—Average annual death rate per million, at age groups, for the two periods 1931-39 and 1940-49.

percentage of female death rates illustrate this in Table 2.

TABLE 2

MALE DEATH RATES AS PERCENTAGES OF FEMALE DEATH RATES FOR ACCIDENTAL POISONING AND FOR ALL OTHER CAUSES OF DEATH COMBINED

Age Group	Accidental Poisoning		All Other Deaths	
	1931-39	1940-49	1931-39	1940-49
Under 1 ..	169	177	131	130
1-4 ..	130	131	111	115

An explanation for the disparity can be found if it is true, as is widely believed, that boys are more exploratory than girls. Certainly males are in general much more liable to injury in the home than females (Lockhart, 1950).

In the decade 1940-49 the average annual death rate per million from accidental poisoning was 8.7 for children aged 1-4. The rates for the three most recent years were slightly above the average, but, as the following annual rates for each year successively in the decade show, there is no firm evidence of a continuing rise: 8.7, 8.7, 8.8, 6.2, 6.4, 10.3, 7.0, 10.9, 9.4, 10.1.

Types of Poison

Records of the poisons stated to have caused the deaths of children aged under 15 were obtained from the Registrar General for England and Wales. Since the hazard is so much less for children older and younger than those aged 1-4, the deaths of children only in the last age group are discussed below. An attempt was made to classify initially into broad groups the remarkably varied collection of poisons that caused their deaths, and five main groups can be defined as follows.

(1) **Medicaments.** These are preparations prescribed by doctors or bought at chemists by patients for therapeutic purposes, to be taken internally or applied externally.

(2) **Disinfectants and Antiseptics.** These are nearly all phenol and cresol preparations, though inhalants containing these may have been the true origin, in which case some or all should be classified under medicaments.

(3) **Household Poisons.** This category comprises poisons commonly used in houses and gardens for purposes other than medication or disinfection, e.g. rat poison, insecticides, turpentine.

(4) **Poisonous Plants.**

(5) **Miscellaneous.** The contents of this category arrive here by exclusion from others. Most of them are poisons sometimes kept at home but not often, e.g., hydrochloric acid (possibly for soldering), chromates, methyl alcohol.

While lack of explicit information makes assignment of any particular poison to its correct group occasionally debatable, there are too few doubtful cases to invalidate the broad classification.

Table 3 shows how the poisons fall into these categories. It will be seen that medicaments in both periods comprise much the largest groups, 52% in 1931-39 and 62% in 1940-49. The difference of 10% between the two periods is not statistically significant (S.E. of difference = 5.7), nor does the distribution of deaths in the 1931-39 totals differ significantly from the distribution in the 1940-49 totals ($\chi^2 = 4.721$, $P > 0.3$). In other words, in the two periods the proportion of deaths in each group is much the same.

Medicaments

It now remains to record in more detail the substances that poisoned these children aged 1-4, and to consider first the medicaments. Here rather more guesswork accompanies the classification because of the scanty information registered.

An important group in both 1931-39 and 1940-49 is the liniments, causing 13 out of 58 deaths (22%) in the first period and 29 out of 135 (21%) in the second. Many of these are attributed to oil of

TABLE 3

NUMBERS OF DEATHS FROM ACCIDENTAL POISONING OF CHILDREN AGED 1-4 YEARS GROUPED BY TYPE OF POISON

Group of Poisons	1931-39			1940-49			% of Cases in Groups	
	M.	F.	Total	M.	F.	Total	1931-39	1940-49
Medicaments	31	27	58	71	64	135	52	62
Disinfectants and antiseptics	3	4	7	11	4	15	6	7
Household poisons	18	11	29	31	16	47	26	22
Poisonous plants	4	4	8	6	2	8	7	4
Miscellaneous	8	2	10	7	6	13	9	6
Total	64	48	112	126	92	218	100	101

wintergreen, bottles of which probably repose unguarded in many homes. The actual figures are as follows:

Deaths from:	1931-39	1940-49
Oil of wintergreen	6	17
Camphor or camphorated oil ..	6	5
Camphor and wintergreen ..	1	-
A.B.C. liniment	-	1
Methyl salicylate	-	5
Not stated	-	1

With these may be mentioned one death from salicylate and one from salicylic acid in 1931-39.

Another prominent though more varied group comprises deaths due to iron and/or strychnine preparations, many of which are probably taken for diagnosed iron-deficiency anaemias or as tonics, though the strychnine in some cases may have come from aperient pills. These cases numbered 19 (33%) in 1931-39 and 36 (27%) in 1940-49. The details are as follows:

Deaths from:	1931-39	1940-49
Iron preparations	2	21
Easton's syrup or tablets ..	10	-
Strychnine	6	15
Nux vomica and belladonna ..	1	-

Anodynes caused a number of deaths in both periods: five (8.6%) in 1931-39 and 23 (17%) in 1940-49. These comprised the following:

Deaths from:	1931-39	1940-49
Aspirin	3	12
Opium or morphine	1	8
Chlorodyne	1	1
Diamorphine	-	2

Quinine preparations (apart from Easton's syrup) caused four deaths in the first period and 12 in the second, digitalis preparations three and four, and hyoscyamine three in the second period only.

Two important groups of drugs caused deaths in 1940-49 only; these were antihistamines and soporifics. Three deaths were attributed to an unspecified antihistamine, one to 'benadryl' and one to pyranisamine maleate. Of the eight deaths due to soporifics, six were caused by phenobarbitone, one by chloral hydrate and one by unspecified sleeping tablets.

Medicaments which were presumably aperients caused two deaths in the first period and two in the second; in the former two cases the drugs contained colocynth and in the latter two aloin.

The remaining preparations that caused deaths in either of the two periods were the following: ipecacuanha, one; acetic acid, four; lethane, four; antimony, one; copper sulphate tablets, one; hydrocyanic acid, one; iodine, one; a tar preparation, one; and unspecified pills and tablets, two.

Disinfectants and Antiseptics

Phenol and cresol (or its allies) have been included under this heading, though it is possible that some of

the deaths were due to drinking inhalants containing creosote.

The preparations in this group caused the seven deaths in 1931-39. They were also responsible for nine of the 15 deaths that occurred in 1940-49; of the remaining four deaths, three were attributed to potassium permanganate and one to mercury perchloride.

Household Poisons

Prominent among these as a cause of death is caustic soda. It was responsible for nine out of 29 deaths in this group in 1931-39 and for 12 out of 47 in 1940-49, when caustic potash also caused a death. About equally dangerous is phosphorus in its various forms, causing six deaths in the first period and 11 in the second; most of these were due to rat poison. Paraffin, kerosene, turpentine and petrol accounted for 15 deaths between them in the two periods, ammonia for five, and nicotine (presumably as insecticide) for four; arsenic as either a rat poison or a weed killer caused three, as did metaldehyde (used as a fuel or a slug poison). The remaining deaths in this group were due to creosote (possibly a 'medicament'), one; oil of citronella, one; carbon tetrachloride, one; oxalic acid, one; and some incompletely specified substances, three.

Poisonous Plants

Out of the 16 deaths during 1931-49, eight were caused by deadly nightshade and three by woody nightshade. The remaining deaths were due to privet berries, one; water dropwort, one; hemlock, one; fungi, one; and unspecified berries, one.

Miscellaneous Group

Hydrochloric acid, including soldering fluid, was the chief cause of death in this varied group of poisons, being responsible for six of the 23 during 1931-49. Others included potassium chromate or bichromate, four; sulphuric acid, two; methyl alcohol, one; and potassium sulphide, one.

Discussion

Probably something over 5,000 fatal accidents occur in the homes of England and Wales every year (Registrar General, 1951), and it is often difficult to determine the cause for the recorded death. The facts set out above have therefore been given in some detail in an attempt to elucidate the causes of a small group of these accidents and to contribute towards their prevention. Representatives of the General Medical Services Committee of the B.M.A. and of

the Pharmaceutical Society have exchanged preliminary views on how to prevent the poisoning of children by medicaments, and an interdepartmental committee set up by the Home Office exists to study the causes of accidents in the home.

In spite of the impossibility of classifying some of the poisons because of incomplete information, there can be no doubt that most of these deaths are caused by medicaments, an observation borne out by Holzel and James (1951) in their study of some cases of accidental poisoning admitted to a Manchester hospital. Drugs and other medical preparations are left in reach of children, who imitate their parents in consuming them. The variety of substances taken suggests that taste can hardly be the attraction in many cases, and merely refraining from prescribing medicines and tablets in a form pleasing to the palate is unlikely to prevent many accidents, though it may be a wise precaution. Spencer (1951) has suggested wrapping single tablets or small groups of them in paper so that they are difficult to undo, and this might be an effectual preventive, albeit expensive.

What these notes show clearly is, first, the special danger to pre-school children of accidental poisoning (also emphasized by Holzel and James, 1951); secondly, that many of the preparations causing death are not generally regarded as dangerous poisons; thirdly, that the preparations are in the main those found very commonly in homes; and, fourthly, that most of these dangerous preparations are medicaments.

*B.M.A. House,
Tavistock Square,
London, W.C.1*

Doctors often warn parents to keep some drug away from children; that their advice should sometimes fail is natural. But it may be doubted whether either doctors or parents are sufficiently aware of how dangerous to children, and how attractive, are many medicaments which, commonly prescribed or bought, are harmless to adults even in large doses. Nor are doctors the only people who might warn members of the public more often. They should surely be joined by the manufacturers, who could label preparations more prominently as poisons, and chemists and ironmongers have an important duty to emphasize the special danger to children of many of the substances they sell.

Summary

Accidental poisoning by ingestion of toxic substances, especially medicaments, is a notable cause of death in the age group 1-4 years.

The poisons causing the deaths of children in this age group in England and Wales during 1931-49 are recorded.

It is not sufficiently realized (what the detailed records show) that many of the medicaments causing death are commonly found in homes and are regarded as harmless to adults in large doses.

I am much obliged to the Registrar General for England and Wales for supplying me with records of poisons that caused the death of children during 1931-49.

REFERENCES

- Holzel, A. and James, T. (1951). *Med. Offr.*, **86**, 169.
Lockhart, R. (1950). *Hlth. Bull., Edinbh.*, **8**, 4.
Registrar General (1951). *Statistical Review of England and Wales for 1946-7*, Text, Vol. 1. Medical.
Spencer, I. O. B. (1951). *Brit. med. J.*, **2**, 1112.