ACCIDENTAL POISONING IN CHILDREN

BY

M. A. HEASMAN

Medical Statistician, General Register Office

(RECEIVED FOR PUBLICATION DECEMBER 23, 1960)

In a statement by the United States Secretary of Health an estimate was made that in that country there were 600,000 non-fatal and 500 fatal poisonings of children annually (Flemming, 1960). Papers by Jacobziner and Raybin (1956) and Kubryk and McKenzie (1958) discuss the problem of poisoning of children in the United States and Canada respectively. This paper shows the position in England and Wales and is based on the morbidity and mortality data available in the General Register Office.

Cases Treated in Hospital

In 1958 the Hospital In-patient Enquiry of England and Wales collected data relating to 10% of all discharges from National Health Service hospitals (excluding mental hospitals). From these data 1,000 consecutive records of poisoning were extracted; 218 related to children under 15 years of age. The subsequent analysis in this section is based on these cases. The age and sex distribution is shown in Table 1.

For all age groups, except the two extremes, cases were seen more frequently among boys than girls. Although only rarely were details available concerning intention, it seems fair to assume that the great majority resulted from inquisitiveness in its broadest sense and could therefore be labelled as accidental. Poisoning among children admitted to hospital is shown to be commonest between 1 and

3 years of age. Over 3 it is relatively uncommon. As these data relate to children admitted to hospital it does not necessarily follow that cases of poisoning are infrequent in the older child, for once a child can talk the amount taken can usually be elicited and cases treated accordingly, often without hospital admission.

TABLE 1

AGE AND SEX DISTRIBUTION OF 218 CHILDREN ADMITTED TO HOSPITAL WITH POISONING

Sex	Age (years)							Total
	0-	1-	2-	3-	4-	5-	10-14	
Males ..	4	47	42	14	9	16	6	138
Females	5	29	19	10	4	2	11	80
Persons ..	9	76	61	24	13	18	17	218

Table 2 shows the nature of poison taken according to the age of the child. A very approximate estimate of 4,100 as the annual number of discharges from hospitals in England and Wales is also given. This was calculated by multiplying up the Hospital In-patient Enquiry data to give a national total. As classified, almost half the cases of poisoning resulted from the ingestion of pills, tablets, etc. 2-year-olds being most frequently affected. Other medical products consisted largely of liniments and

TABLE 2

AGE DISTRIBUTION AND POISON INVOLVED, AMONG CHILDREN ADMITTED TO HOSPITAL, AND ESTIMATED ANNUAL NUMBER OF DISCHARGES IN ENGLAND AND WALES

	Age (years)							Total Under 15 years	Estimated Number of Discharges in England and Wales
	0-	1-	2-	3-	4-	5-	10-14		
Pills, tablets, etc.	2	29	36	16	8	3	11	105	1,970
Other medical products	1	5	6	3	1	—	—	16	300
Household substances	4	38	16	2	1	6	3	70	1,320
Berries, seeds, etc.	—	—	1	1	1	5	—	8	150
Coal gas	1	—	—	—	1	1	1	4	80
Other and ill-defined substances . .	1	4	2	2	1	3	2	15	280
Total	9	76	61	24	13	18	17	218	4,100

liquid medicines, although a suppository was eaten in one case, and an inhalant capsule in another.

The most frequent cause of poisoning was the group of household substances, responsible for one-third of the admissions. Most commonly the child was in its second year.

Berries and plant substances were responsible for only eight admissions, usually in older children. Laburnum seeds were incriminated in four cases.

There were no deaths among this series of cases, although during 1958 there were 44 deaths of children in England and Wales as a result of accidental poisoning (see below).

Poisoning by Pills, etc. As shown by Table 3, the commonest drugs taken accidentally by children and resulting in admission to hospital were members of the aspirin group. Forty-four patients were admitted for this reason, 20% of all cases in the series. In seven instances the children were kept in hospital for more than three days.

The next most common cause of poisoning was the barbiturates, with 28 cases. Details of the type of barbiturate were not recorded sufficiently often for any worthwhile analysis to be made. It is noteworthy that the five children kept in hospital for more than three days with barbiturate poisoning were all girls and all aged 13 or 14. These may have been suicidal attempts, although this was only specifically stated in one case.

Iron preparations were responsible for seven cases, six of them children under 5 years. Phenolphthalein was responsible for four cases; it is an ingredient of laxative chocolate.

Among cases of poisoning by other substances, the two children staying in hospital for more than three days were a child of 2 who had taken some vitamin E and a child of 13 with phenytoin sodium poisoning.

Poisoning by Household Substances. Table 4 shows the wide selection of household substances responsible for the poisoning of children. Turpentine, paraffin, and disinfectants stand out as the most frequent cause of admission and the first two were also responsible for a large proportion of cases staying more than three days in hospital. This may have been because of the potential danger involved rather than the severity of the illness. Only two children, both having ingested paraffin, stayed in hospital for more than two weeks.

Cases Treated in General Practice

Besides those children taken to hospital other cases of poisoning that occur include those treated at home and those that die before reaching hospital.

TABLE 3

TYPE OF PILL OR TABLET INVOLVED IN POISONING OF CHILDREN ADMITTED TO HOSPITAL, BY AGE OF CHILD, DISTINGUISHING THOSE CASES KEPT IN HOSPITAL FOR MORE THAN THREE DAYS

Substance	All Cases			Cases with Duration of Stay Over Three Days		
	Age (years)			Age (years)		
	0-5	5-14	Total	0-5	5-14	Total
Aspirin and salicylates ..	42	2	44	5	2	7
Barbiturates ..	20	8	28	0	5	5
Iron preparations ..	6	1	7	0	0	0
Phenolphthalein ..	4	0	4	0	0	0
Other substances ..	19	3	22	1	1	2
Total ..	91	14	105	6	8	14

The number of cases of poisoning among children seen by general practitioners is unknown, but can be very approximately estimated at 8,000 (data from Logan, 1960). No series is known that is large enough for any estimate to be made of the type of poison implicated. If it is assumed that none of those cases in hospital were seen by general practitioners first, then the addition of the 4,000 cases requiring hospital treatment means that there is a maximum of about 12,000 cases of poisoning that require some form of skilled medical treatment in one year. Cases treated by parents are, of course, not included; neither are those treated only as out-patients by hospitals. This represents a rate

TABLE 4

TYPE OF HOUSEHOLD SUBSTANCE INVOLVED IN POISONING CHILDREN ADMITTED TO HOSPITAL, BY AGE OF CHILD, DISTINGUISHING THOSE CHILDREN KEPT IN HOSPITAL FOR MORE THAN THREE DAYS

Substance	All Cases			Cases with Duration of Stay Over Three Days		
	Age (years)			Age (years)		
	0-5	5+	Total	0-5	5+	Total
Bleach ..	3	—	3	—	—	—
Brandy ..	1	—	1	—	—	—
Carbon tetrachloride ..	2	1	3	—	—	—
Caustic soda ..	—	1	1	—	1	1
Cosmetics ..	3	—	3	1	—	1
Creosote ..	1	—	1	—	—	—
D.D.T. ..	1	1	2	—	—	—
Detergents ..	1	1	2	—	—	—
Disinfectants ..	7	—	7	1	—	1
Dye ..	1	—	1	—	—	—
Ink, commercial ..	1	—	1	—	—	—
Mercury ..	1	—	1	1	—	1
Moth balls ..	1	—	1	—	—	—
Paint ..	1	—	1	—	—	—
Paraffin ..	14	2	16	6	—	6
Polish (floor) ..	1	—	1	—	—	—
Polish (furniture) ..	1	1	2	—	—	—
Polish (silver) ..	2	—	2	—	—	—
Rat poison ..	1	—	1	—	—	—
Scourer ..	1	—	1	—	—	—
Surgical spirit ..	1	—	1	—	—	—
Turpentine ..	16	2	18	5	—	5
Total ..	61	9	70	14	1	15

TABLE 5
DEATHS OF CHILDREN UNDER 15 IN ENGLAND AND WALES ATTRIBUTED TO
ACCIDENTAL POISONING BY YEAR 1954-1958

I.C.D. No.	Type of Poison	1954	1955	1956	1957	1958
E870-E888	Solid and liquid substances	27	28	16	21	24
E890-E895	Gases and vapours	22	23	31	10	20
	Total	49	51	47	31	44

of 1.2 per 1,000 children under 15 per annum and is considerably less than the estimate made for the United States (11.2 per 1,000).

Deaths of Children from Poisoning

Fortunately the number of accidental deaths of children from poisoning is small. Table 5 shows the number for the years 1954-1958. There seems to have been little change in the number of deaths over this period (about 44 per year). Just over half the deaths were caused by solid and liquid substances. Almost all the deaths by gassing were due to coal gas poisoning.

Table 6 shows the nature of the solid or liquid poison causing death in the same period. As with the hospital admissions, aspirin and salicylates head the list as the commonest single cause of death. Iron preparations were responsible for 12 deaths, but it is interesting to note that none occurred in 1957 or 1958. Strychnine was responsible for 10 deaths. Among the other substances, lead caused 12 deaths, and paraffin and caustic soda four each. Death from poisoning was relatively rare over 5 years of age, and was particularly so with drugs.

TABLE 6

DEATHS OF CHILDREN IN ENGLAND AND WALES ATTRIBUTED TO ACCIDENTAL POISONING BY SOLID AND LIQUID SUBSTANCES, 1954-1958

I.C.D. No.	Type of Poison	Age (years)		Total
		0-4	5-14	
E871	Barbituric acid and derivatives	3	1	4
E872	Aspirin and salicylates ..	22	0	22
E874	Other analgesic and soporific drugs ..	6	1	7
E876	Strychnine	10	0	10
E878 (pt.)	Iron preparations	12	0	12
E870, E877, E878 (pt.)	Other and unspecified drugs ..	15	1	16
E881	*Petroleum products	5	0	5
E883	†Corrosives	5	3	8
E885	Lead and its compounds ..	11	1	12
E884, E886, E888	Other and unspecified solid and liquid substances ..	17	3	20
Total		106	10	116

* Paraffin, four; petrol, one.

† Caustic soda, four; disinfectants, two; sodium cyanide, one; boric acid, one.

Discussion

Cases of poisoning among children admitted to hospital are of two overlapping types; those where the child has taken a quantity of poison sufficient to make hospital treatment necessary and those where the child has taken an unknown quantity of what may be an unknown poison and admission is desirable as an insurance against the development of serious symptoms.

By the fact that 86% of cases admitted to hospital stayed there for less than four days it appears that relatively few cases are of any great severity and many may be trivial. Despite this, each case remains a potential tragedy and this is emphasized by the fact that there are about 23 deaths per year in England and Wales from solid and liquid substances alone. There can be little doubt that nearly all were preventable. Attention has been focused in recent years (Jolly and Forrest, 1958), on the desirability of making pills less attractive to children. Laudable though this aim may be, the data presented here show clearly that it is the availability of poisons which is at least as, if not more important than their attractiveness. There can be few families in this country that do not have paraffin, turpentine or aspirins somewhere in the house and it is these three substances together which accounted for almost 36% of hospital admissions for poisoning in children, and aspirins were the commonest single cause of poisoning death. None of the household substances mentioned would be classed as attractive in the sense that sweets may be, although it is true that some of the liquids were probably kept in old lemonade bottles. Among the medicinal substances, the most inviting was probably the laxative chocolate although the iron preparations were mostly sugar-coated and some of the barbiturates may have been attractive on the grounds of colouring. Together these amount to 39 out of 218 cases, or 18%. Thus it seems clear that the prevention of poisoning lies particularly with parents and the various means of publicity by which they can be reached. Special emphasis should be laid on the fact that it is the toddler who is most at risk. In this connexion it is worth mentioning the work of Russell, MacKenzie and McPhail (1960)

who showed the pertinacity of children in opening cupboards and bottles protected by so-called safety devices.

Harmful substances, however unattractive they may seem to adults, must not be left where they can be reached by the inquisitive fingers of the young child.

Summary

In England and Wales there are approximately 8,000 cases of poisoning annually among children seen by general practitioners, 4,000 are admitted to hospital and there are 44 deaths.

Boys are more commonly affected than girls and the maximum incidence is between 1 and 3 years of age.

The commonest poisons leading to admission to

hospital are aspirins, paraffin and turpentine. The commonest single cause of death is aspirin and salicylate poisoning.

The availability of a poisonous substance to a child is at least as important as its attractiveness.

REFERENCES

- Flemming, A. S. (1960). Accidental poisoning. *U.S. Publ. Hlth Rep. (Wash.)*, 75, 91.
- Jacobziner, H. and Raybin, H. W. (1956). Accidental poisonings in childhood and their prevention. *J. Pediat.*, 49, 592.
- Jolly, H. and Forrest, T. R. W. (1958). Accidental poisoning in childhood: An experimental approach to the prevention of poisoning by tablets. *Lancet*, 1, 1308.
- Kubryk, D. and McKenzie, A. C. (1958). Accidental home poisonings. *Canad. J. publ. Hlth*, 49, 420.
- Logan, W. P. D. (1960). *Morbidity Statistics from General Practice*, Vol. II (occupation). General Register Office Studies on Medical and Population Subjects, No. 14. H.M.S.O., London.
- Russell, I. H., MacKenzie, S. and McPhail, G. (1960). Accidental poisoning in young children. Experiments with some safety devices. *Med. Offr*, 103, 256.