

UNIVERSITY OF NAIROBI

CIRCUMSTANCES OF ACCIDENTAL POISONING
IN CHILDHOOD IN KENYATTA NATIONAL HOSPITAL,

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DECLARATION

I certify that this dissertation is my own original work and has not been presented for a degree in any other University.

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S U M M A R Y :

The circumstances of accidental poisoning in childhood were studied in 59 children brought to Kenyatta National Hospital with known or suspected acute poisoning. The factors studied were the age and sex distribution of the poisoned children, the poisoning agents, the circumstances under which these substances were acquired and whether first aid measures were taken to remove these substances at home.

The commonest age group affected was found to be the under 5 years, comprising of 40 children (73%). The peak age was noted to be 1-2 years accounting for 16 children (33%), and there were 39 boys (67%).

The most frequently ingested substances were household agents (36%), medicaments (32%) and food and plant agents (24%). Majority of the substances (83%) were obtained from 'own house'.

The most important contributory factor was that the poisons were 'easily accessible' in virtually all children accidentally poisoned. Kerosene, the commonest, poisoning agent, was 100% 'accessible' to the children ingesting it and the same applied

for the medicaments accidentally ingested. Only 25% of the children had 'appropriate¹ first-aid measures taken-where applicable,,

UNITED STATES OF AMERICA

I N T R O D U C T I O N :

Accidental poisoning may be defined (1) as an abnormal ingestion, absorption or inhalation of a substance which may produce untoward symptoms or toxic manifestations, such as kerosene or medicaments such as aspirin.

Accidental poisoning in childhood (2) is mainly a problem for those between the ages of one and five years. There are occasions when very young children have been given the wrong substances. Children over five years old are sometimes brought to hospital in groups having taken noxious substances. Children over the age of eleven years may make deliberate suicide attempts. In the teenage group, deliberate self-administered drug overdose is becoming increasingly common, such as with amphetamines, bhang, cocaine and petrol sniffing,

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Reports from the developed countries (3,4,5) indicate that accidental poisoning in children under five years of age is on the increase although this is largely preventable. In the United Kingdom, a report by the Medicines Commission (3) set up to consider the presentation of medicinal products as it may

affect the safety of children revealed that between 1964 and 1969, the number of children aged under five years admitted with suspected poisoning from medicines more than doubled. High among the culprits were salicylates, especially aspirin, and iron preparations, with tricyclic antidepressants and barbiturate being a notable hazard,, Data from the National Clearing-house for Poison Control Centres in the United States of America (4) indicates a decline in the mortality due to poisoning in the under five years age group, between 1971 and 1973. Although aspirin was still the most frequently ingested drug according to these statistics, there was a decline of aspirin ingestions by 75 percent between 1965 and 1973. This decline was attributed mainly to a nationwide effort to limit the number of aspirin tablets per container, institution of safety packaging and to increased public awareness of the hazards of aspirin.

Jackson and others (5) while investigating the circumstances of accidental poisoning in childhood at the Royal Victoria Infirmary in 1968 found that the commonest ages were one, two and three years and that 80 percent of substances causing poisoning were easily accessible to the child.

With a view, to reducing the frequency of poisoning in childhood, they have suggested the following preventive measures:

1. A reduction in the quantity of drugs kept in the house.
2. The provision of safety packaging.
3. Making tablets less attractive to children.
4. Clear identification of potential poisons.
5. Increased parental awareness of the circumstances under which poisoning occurs.

A socio-medical survey carried out in New Zealand (6) in 1975 showed a male preponderance in accidental poisoning, with 75.4 percent of the children being one and two years of age. Household agents were the commonest substance ingested, accounting for 62 percent of the poisons while medicaments accounted for 38 percent of the poisons. In this survey, where 95.4 percent of the population was urban, 79.1 percent of the poisoning episodes occurred in the house, with a lower incidence in winter, probably due to better supervision during this period. In over 50 percent of the patients, no first-aid measures had been taken to remove the

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poison. Hancock (7) working in the Children's Hospital Sheffield in 1973 indicated that delay in seeking medical care after poison ingestion is associated with a higher incidence of symptoms of ingestion and a longer duration of hospital stay, morbidity and mortality. E*

Accidental poisoning in childhood is largely preventable. First aid measures to remove or dilute the poison are undoubtedly useful and public awareness of these measures would make a positive contribution by reducing the morbidity associated with these poisons. Steps in the management of these patients (8,5,10) include identification of the poison; removal before absorption either by inducing vomiting or by gastric lavage (except when the poison is suspected to be a corrosive or kerosene;) modification or absorption either by use of activated charcoal which adsorbs many poisons, thereby preventing their absorption or by catharsis which decreases gastro-intestinal transit time and hence reduces absorption: facilitation of elimination once the poison is absorbed, either by increasing renal excretion or by dialysis or exchange transfusion; the use of specific antidotes and chelating agents. Supportive measures such as maintenance of adequate hydration and correction of acid-base imbalances are crucial in the management of these patients.

Reports from the developing countries indicate that accidental poisoning like in the developed countries is a problem of the one to five years age group. Bwibo (11) while studying accidental poisoning in children at Mulago Hospital, Kampala, Uganda in 1969, found that they accounted for 130 (0.65 percent) of the total paediatric admissions (20,061 patients) between 1963 and 1963, with a mortality of 7 (5.4 percent). This is about ten times the mortality reported from developed countries. Majority of patients (81.5 percent) were below five years of age with the highest incidence being in the one to two years age group. Kerosene was the most frequently ingested substance with aspirin being a close second, the explanation being that kerosene is abundantly used as a cooking fuel in our communities. Overall the incidence of accidental poisoning was noted to be on the increase while male preponderance was also noted. A similar pattern was found by Cardozo and Mugerwa (12) working, in the same country'. Seriki (10) in his review article has listed kerosene as the most frequently ingested substance in Nigeria, Zambia and India.

In Kenyatta National Hospital, there have been several reports on childhood poisoning. Ojwang (13) has reported on 20 cases of aspirin poisoning in a one and a half

year period between 1979 and 1980. Of these, 75 percent (15 patients) were five years and below with 6 patients (30 percent) being of the ages 1 - 2 years, and the male:female ratio being 4:1, Similarly Kahuho (14) has reported on 72 patients admitted to the intensive Care Unit of Kenyatta National Hospital between 1972 and April 1978. This highly selected group of patients comprised 3.4 percent of the total admissions (2,135 patients) in this period. There were 25 children (34.7 percent) aged below 5 years and of these, 13 patients (52 percent) died. Organophosphorus chemicals were blamed for most of the admissions (24 out of 72 patients).

Various workers (1, 6) have expressed the need for sociomedical studies to identify the factors involved in accidental childhood poisoning, with a view to recommending appropriate preventive measures.

During the many occasions the author had the privilege of working in the Acute Paediatric Ward of Kenyatta National Hospital, referred to as Paediatric Observation Ward (P.O.W.), the author noted that the number of cases of acute childhood poisoning was on the increase.

Furthermore, it was noted that majority of the patients were admitted for one or two days and discharged with little or no follow-up. Worse still, it became clear that clinicians were omitting one of the major facets in the management of acute childhood poisoning, namely prevention. Concurrently, the concept of Primary Health Care where more emphasis has been on promotive and preventive health services rather than curative services, was gaining popularity especially in the developing countries. The need to tackle the preventive aspects of accidental childhood poisoning thus became a priority.

For any preventive measures to be instituted, knowledge of who gets poisoned, substances commonly ingested and the circumstances under which such poisoning occurs, is necessary in the various communities and centres. This study was undertaken with the aim of providing this information in our centre which serves mainly an urban population and a peri-urban, predominantly agricultural community besides being a National Referral Centre. It is hoped that from this information, relevant preventive measures will be recommended. The following were the specific objectives of this study:-

OBJECTIVES:

1. To determine the age and sex distribution of the acutely poisoned children,
- 2,, To determine the substances ingested or inhaled*
3. To determine the circumstances under which these substances are ingested or inhaled,,
4. To determine whether first-aid measures are taken to remove these poisons at home.

MATERIALS AND METHODS:

This study, carried out at the Acute Paediatrics Ward of Kenyatta National Hospital, referred to as the Paediatric Observation Ward (POW) was a prospective study performed from the 1st of September to 31st December 1984»

PATIENT RECRUITMENT IN THE STUDY:

All children aged upto thirteen complete years (the age beyond which patients are admitted to adult wards in Kenyatta National Hospital) and presenting to Kenyatta National Hospital with known or suspected poison ingestion, were included in this study. Posters were put up in the patient receiving areas, that is, Paediatric Filter Clinic and the Casualty Department, advising medical personnel working there to refer all children aged upto thirteen years with known or suspected poison ingestion to P.O.W. for the purpose of this study. In addition, doctors and nurses working in P.O.W. were informed to alert the author whenever such a patient was admitted, Altogether, fifty-nine patients were recruited into the study.

DATA COLLECTION:

All patients referred to P.O.W. with known or suspected poison ingestion underwent a thorough clinical

evaluation by either the author, a Paediatric Resident or a Paediatric Consultant who instituted the necessary management. Whenever it was not possible to assess the patient on arrival the author was contacted on an internal telephone extension to review the patients, besides regular thrice a day. visits to P.O.W. to review any such admissions. All patients were reviewed by the author who worked in P.O.W. for three out of the four months of the study.

There were two questionnaires A and B, prepared for this study and which appear at the appendix. These questionnaires were based on information gathering in similar studies done elsewhere on the subject, especially two such studies done in the United Kingdom and one in New Zealand (5,6,7).

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"questionnaire A relating to the ingested poison was filled on interviewing the parents or relatives accompanying the child to the hospital. All such interviews were performed by the author.

For the sake of completeness questionnaire B based on clinical evaluation by the author was filled. Diagnosis of poisoning for this study was based on the following-criteria:-

1. Detailed history obtained on interviewing the parents or relatives.
- 2,, A thorough clinical examination to evaluate the' general and systemic effects of the poison, especially on the cardiovascular, respiratory and the central nervous systems which are more frequently involved in majority of poisonings,

Biochemical and toxicological analysis was carried out on a limited scale due to inadequate equipment and reagents.- Efforts to identify pharmacological reagents brought to hospital were made in collaboration with the Department of Pharmacology. Bacteriological studies were carried out in suspected food poisoning to identify the organisms.

Each child was managed according to individual needs, taking into account the known or suspected poison, its toxic manifestations on clinical evaluation and any complications. Thus measures to remove the poison where indicated, reduced absorption, increase excretion, specific antidotes and supportive measures were applied as indicated in each child.

The poisons were grouped into four broad categories similar to those of Swinscow (15) with slight modification.

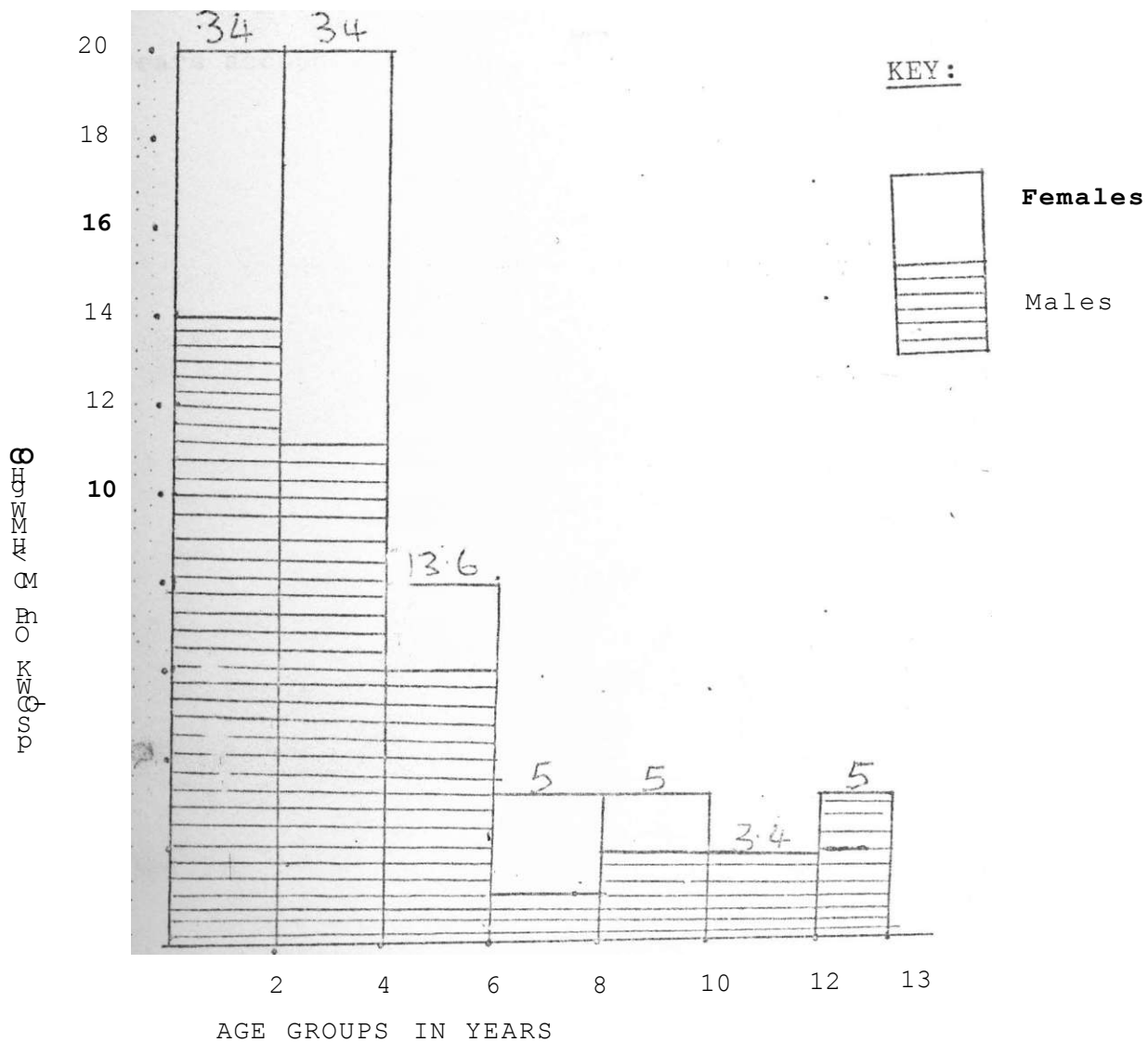
1. Medicaments - meaning preparations prescribed for either internal or external use by medical personnel or bought without prescription for the same purpose such as aspirin, chloroquin, ointments.
2. Household and agricultural agents - meaning preparations used in homes and gardens such as kerosene and pesticides,
- 3c Food and plant agents - meaning substances used as food or drink such as alcohol and food poisoning.
4. Miscellaneous agents - meaning those substances not falling in any of the above categories.

R E S U L T S :

AGE AND SEX DISTRIBUTION:

Between 1st September and 31st December 1984, 59 children were seen and included in this study. Figure I shows the age and sex distribution of the 59 children,

FIGURE I: BAR CHART SHOWING THE AGE AND SEX
DISTRIBUTION OF THE 59 ACUTELY
POISONED CHILDREN:



NOTE: The numbers appearing on top of each block are the corresponding percentages of the total patients studied. Only one child was below one year of age.

Figure I shows that there was a male preponderance with an approximate male to female ratio of 2:1. Table I shows the age distribution of 43 children (73%) aged below 5 years. The peak age was 1 - 2 years accounting for 19 children (33%).

TABLE I: AGE DISTRIBUTION OF THE 43 POISONED
CHILDREN AGED BELOW 5 YEARS:

AGE/YRS	NO. OF PATIENTS
< 1	1
> ^x - 2	19
> 2 - 3	12
> 3 - 4	8
>4 - 5	3
TOTAL	43

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The combined ages of 1 - 3 years accounted for 31 children (53%) in the study. There were 16 children (27%) aged above 5 years, with poisoning,, The 7 - 9 years age group emerged as the least poisoned group after which a secondary peak was notable towards adolescence as shown in Table II.

TABLE II: AGE DISTRIBUTION OF SIXTEEN CHILDREN
AGED ABOVE FIVE YEARS WITH POISONING

AGE GROUPS/YEARS	NO. OF CHILDREN
>•5 - 7	8
> 7 - 9	1
> 9 - 1 1	3
> 1 1 - 1 3	4

POISONING AGENTS;

The poisoning agents in the 59 children are listed in table III. Thirty six percent of all poisons ingested or inhaled were household agents, with kerosene predominating. A remarkably high number of boys (8 of the 11 cases) had kerosene poisoning. Organophosphate based compounds ranked second to kerosene in this category of household agents. Other household agents included rat poison, disinfectants such as dettol and one child who was found chewing a dry cell.

Medicaments accounted for 32% of the poisoning agents with anticonvulsants and tranquilizers predominating. There was a relatively low incidence of salicylate ingestion (3 out of 19 children). Of the other medicinal preparations there were two children who ingested antibiotic capsules and two children with antiseptic lotions ingestion. Other medicaments encountered included acetaminophen, chloroquine, antihistamines and antiemetics.

TABLE III: POISONING AGENTS IN THE 59 POISONED
 CHILDREN-

A G E N T	Male	Female	Total	$\frac{O}{O}$
HOUSEHOLD AGENTS:	13	8	21	36
Kerosene	8	3	11	
Organophosphate Compounds	2	3	5	
Rat Poison	1	1	2	
Dettol	1	1	2	
Dry Cell	1	0	1	
MEDICINAL PREPARATIONS:	14	5	19	32
Anticonvulsants/Tranquillizers	4	2	5	
Salicylates (Aspirin)	3	0	3	
Antihistamines	2	1	3	
Antibiotic Capsules	2	0	2	
Antiseptic lotions	1	1	2	
, Others	2	1	3	
FOOD AND PLANT AGENTS:	9	5	14	24
Food	4	4	8	
Plants	3	0	3	
Ethyl Alcohol	2	1	3	
MISCELLANEOUS AGENTS	3	2	5	8
Carbon Monoxide	2	2	4	
Unidentified Corrossive	1	0	1	
TOTAL	39	20	59	100 [^]

Food and plant agents were responsible for 24% of the poisoning agents with food agents in 'own home' predominating (8 out of 14 children). Five children from the same family had salmonella typhimurium food poisoning while the agent could not be identified in a further 3 children. Three children with plant poisoning had Datura Stramonium poisoning, while three other children had alcoholic intoxication. Carbon monoxide poisoning predominated in the miscellaneous group.

CIRCUMSTANCES IN WHICH POISONING OCCURRED

SOURCE OF THE POISON:

Majority of the children (83%) obtained the poison from 'own' house as shown in Table IV.

TABLE IV: SOURCE OF THE POISON FOR THE 59

POISONED CHILDREN

A G E N T	INSIDE OWN HOUSE	OUTSIDE OWN HOUSE	TOTAL
MEDICAMENTS	18	1	19
NON-MEDICAMENTS	31	9	40
TOTAL	49	10	59
PERCENT	83	17	100

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HOUSEHOLD AGENTS:

These were the commonest poisoning agents with kerosene predominating. All children with kerosene poisoning accidentally ingested it, having obtained it from inside their 'own' house where it was located on the floor and was therefore easily accessible and put either in soda or beer bottles or in empty containers. Similar circumstances were found with the other household agents with the following exceptions :-

1. A five month old infant who was given rodent poison by the mother in a suicide bid and a 12 year old boy with a history of abnormal behaviour who ingested tick poison, obtained from outside the house.
2. Two siblings aged 8 and 11 years who ingested rodent poison containing Thallium Sulphate in a deliberate self poisoning after being threatened with caning by the mother, because of mischief.
3. Four children who had outdoor misadventures.
 - in form of alcoholic intoxication in three
 - and eating a dry cell in the fourth.

FOOD AND PLANT AGENTS:

A total of 8 children from two families had acute food poisoning. In both families, food was consumed by all members of the household present at the material time and all subsequently had acute food poisoning. The three children with alcoholic intoxication had outdoor misadventures and the circumstances of alcohol ingestion could not be established any further. Similarly the three children with plant poisoning had an outdoor misadventure in a group. They picked 'greens' outside their home, cooked, and ate them and ended up with Datura Stramonium poisoning.

MEDICAMENTS:

All children ingesting medicinal preparations obtained them from inside 'own' house except one child who ingested dropped tablets, while playing outdoors with other children. Most of the drugs were obtained from the hospitals and in majority of cases were- for use by others and not the child. In all instances of accidental self-administered drug ingestion, the drugs were easily accessible as shown in Table V.

TABLE ' y: CIRCUMSTANCES UNDER WHICH POISONING
OCCURRED WITH MEDICAMENTS IN 19
CHILDREN:

CRITERIA	NO. OF PATIENTS
1. Who administered the medicine to the child:	
Self	15
Others	4
2. Source of the Mdicine:	
Hospital	15
Over the counter	3.
Not known	1
3.. Of-the Self administered, medicine •	
easily accessible	15
4. User of the Medicine	
Others	16
Child '	3

FOR EXPLANATION SEE TEXT:

Deliberate self poisoning was seen in only one child, a 13 year old boy who had been on treatment for epilepsy and had a history of abnormal behaviour who ingested an unknown number of phenobarbitone tablets. Of the medicaments administered by others, two children were inadvertently given antiseptic lotions for fever, one child had an anti-diarrhoeal mixture given for diarrhoea and ended up with phenothiazine poisoning. A fourth child, who unfortunately died had been given an overdose of aspirin continuously for four days, by the mother for a discharging ear.

MISCELLANEOUS ACCIDENTS:

In this group, four cases of carbon monoxide poisoning were seen, three occurring at night and the fourth during the daytime. In both instances involving two families, the mothers were also affected and these were deemed 'unavoidable', only other child in this group had an outdoor misadventure, ingesting an unknown-corrosive, once again was 'unavoidable' accident.

Finally of the 16 children (27%) aged above five years with poisoning, eight children (50%) had food poisoning, four had deliberate self poisoning and were referred for psychiatric

follow-up, two had alcoholic intoxication, and one each of carbon monoxide poisoning and erroneous drug administration respectively. All these were deemed 'unavoidable' accidents.

FIRST AID MEASURES:

Information on whether First aid measures were taken to remove or dilute the poison at home was obtained from 32 patients. 15 patients (47%) had such measures taken although the measures were 'appropriate' in only 8 children (25%). Of the 11 children with kerosene poisoning 6 had first-aid measures taken in form of diluting the kerosene with milk followed by vomiting, either spontaneously or induced by pharyngeal irritation. Only one child was spared from the above mentioned procedure. Much has been talked about the use of syrup of Ipecac in stimulating vomiting. In none of the patients in this study was this used as a first aid measure. On the contrary milk was commonly given in acute childhood poisoning, although it was not recorded whether the milk was given as a poison diluent or a 'poison antidote'.

OTHER INTERESTING FINDINGS:

MEDICAMENTS:

Of 19 children with poisoning with medicinal preparations, five (25%) were first borns.- None of

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the children was an 'only' child. Only one child had a history of previous poisoning, majority of the children having the first episode of poisoning. Clinical evidence of poisoning was present at admission in 12 children (64%), and 8 children (42%) were admitted for more than 24 hours, the rest being admitted for 24 hours or less, or being treated and discharged.

Poisoning with medicaments seems to have aroused an urgency in seeking medical care. The time of poison ingestion was not known in only one child and majority of the parents were able to tell the approximate time of poison ingestion. A delay of six hours or less was seen in 10 children while a further 8 had a delay of more than six hours. One such delay was the fatal case of salicytate .poise .ing mentioned earlier. The mother, a divorcee dealing with an illicit local brew had continuously for four days^, given an overdose of aspirin for a discharging right ear. At admission, the poor boy was in severe metabolic acidosis and was immediately whisked to the intensive care unit for respiratory support, correction of the metabolic deficit, forced alkaline diuresis and possibly dialysis but succumbed 48 hours after admission. The only other fatality in this study was a 2 year old female child who was under the care of her

father and ingested an unknown number of Trifluoparazine (stelazine) tablets and subsequently died of respiratory depression. Apart from the four children inadvertently medicated and a 13 year old child with epilepsy who deliberately medicated himself, majority of the other children ingested the medicaments while under the charge of an adult. Only in one instance was the child left alone in the house. A further 2 children were under the care of older siblings aged below 10 years in both instances.

NON-MEDICAMENTS:

"In this category, comprising of 40 children, only one child had a history of previous poisoning. In 28 children (70%).clinical evidence of the poisoning agent was present when first seen in the hospital. Nevertheless, it is gratifying to note that majority of these children had mild poisoning with 22 children (55%) being either treated and discharged or admitted for less than 24 hours. The longest duration of admission in this group was five days in only one child with organo-phosphate poisoning, and there was zero mortality in this category.

Of the 16 children aged above five years mentioned earlier, 14 were in this category. Excluding this latter group, majority of the children (14 out of 26) were brought to hospital within 6 hours of poison ingestion. In a further 7 children, the time of poison ingestion was not known and only in 5 children was there a delay of more than 6 hours before seeking medical care.

Once again majority of the children were under the care of an adult and only in 3 cases were the children left alone or under the care of older sibling-aged below 10 years. In fact the general impression was that although majority of the children were under supervisor, the caretaker was busy with household chores in most of the instances.

D I S C U S S I O N :

It is generally agreed that poisoning in childhood is mainly accidental unlike in adults where deliberate poisoning predominates. The true incidence of accidental childhood poisoning is not known (5). This is because poisoned children may either be treated at home by the parents, or a family doctor, or may be treated in any of the numerous private hospitals and clinics, so that only a fraction of them are treated at the state medical institutions. In the latter the problems of notification and maintaining accurate medical records, particularly in the developing countries, compounds this even further.

The finding, therefore, of 59 children with acute poisoning in only four months, does not only represent a considerable expense and distress to the state, the parents and the child, but also suggests that acute childhood poisoning is a problem of considerable magnitude in this country.

The male preponderance of accidental childhood poisoning noted in this study has also been reported by other workers (5,6,7,10,11,12). This male preponderance is usually attributed to the greater inquisitiveness of boys compared to

to girls.

The combined ages of 1, 2 and 3 years accounted for 31 (53%) children in this study, and for 72% of all children aged below 4 years in the study. That this is the commonest age group affected has been reported by other workers (5,6,7,11) and is said to 'to represent the age when the infant starts to walk and .to show curiosity in his environment without having a social conscience¹' (7). A small peak in incidence was noted towards adolescence. Jackson and others (5) found a similar peak and attributed it to deliberate self-poisoning mainly. In this study, three out of the five adolescents had deliberate self-poisoning.

The commonest poisoning agents were household agents (36%), followed by medicaments (32%) and food and plant agents (24%). This pattern of childhood poisoning, has been reported by other workers in developing countries (10,11,12). By contrast, in most of the western series, medicaments have been the number one culprit (3,4,5) , although one recent report from the United Kingdom (16) indicates that household agents have overtaken medicaments as the commonest agents of accidental childhood poisoning.

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This changing trend is probably due to the various preventive measures taken (5), particularly with regard to safety packaging and storage of drugs and to increased public awareness of the potential dangers posed by these drugs. It is also conceivable that whereas therapeutic agents are widely recognised as being poisonous and dangerous to children, common household agents, such as insecticides, kerosene, disinfectants, cleaning lotions and others may not be regarded in the same light. Indeed, Berfenstam and Beskow (17) found in a domestic survey in Sweden that medicines were generally more safely stored than household chemicals.

Of the household agents, kerosene was the most frequently ingested substance, accounting for 19% of all the poisoned children and for 52% of all ..A the household agents. This is in agreement with reports from other workers in developing countries (10,11,12). Kerosene is abundantly used as a cooking fuel and for lighting (11) and this abundance may explain the higher incidence of kerosene ingestion. Organophosphate-based compounds, in form of insecticides and rodent poisons were the second commonest household agents ingested.

Medicaments were the second commonest agents

ingested, with tranquillizers and anticonvulsants predominating, and only a few cases of aspirin poisoning were noted. There is a general agreement that most of the aspirin tablets causing accidental poisoning are bought over the counter and not supplied on prescription. In this study, the drugs were obtained on prescription in majority of the poisoned children (15 out of 19 children) and this may explain the low incidence of aspirin poisoning. It is also the author's contention that many of the cases of aspirin poisoning may have been so mild that they either were not recognised or did not warrant medical attention or were treated elsewhere and never got to Kenyatta National Hospital.

The other poisoning episodes namely food poisoning, plant poisoning and carbon monoxide poisoning, occurred in groups mainly.

Majority of the poisoning agents (83%) were obtained from 'inside own house'. This was particularly so with kerosene, the most frequently ingested substance. *All children (11) ingesting kerosene obtained it from 'inside their home' where it was located on the floor either in empty soda or beer bottles or in empty cans and was therefore easily accessible. Similar circumstances were

noted with regard to medicaments, which were found to be 100% easily accessible to all the children ingesting them accidentally, (15 out of 19 children). Indeed, this study shows that the most important contributory factor in childhood poisoning is -that the poisonous agents are too easily accessible to the children, and are located in the house in most instances. Similar sentiments were echoed by Jackson and others (5), who found that the poisoning agents were easily accessible to the children in over 80% of the instances.

.Several episodes of poisoning were deemed 'unavoidable' i.e. the nature of the accidental poisoning was such •that it was avoidable if adequate safeguards had been taken. Among these were the poisoning episodes that occurred in groups, namely food and plant poisoning, carbon monoxide poisoning and alcoholic poisoning.

One child aged five months was deliberately poisoned by the mother in a suicide bid by the latter, following a family squabble. Dine and McGovern (18) have described seven cases of intentional poisoning in childhood as a form of child abuse and reviewed literature on a further forty-one reported cases . Child abuse by poisoning is usually committed by person with character disorders requiring hospitalisation and therapy. The commonest form of abuse is excessive salt ingestion with water restriction',^{as reported} from these western

studies. Perhaps the attempted murder of the infant falls in th'is category. Emotional and family stresses may play an aetiologic role in accidental poisoning (1,19,20). tal disharmony was noted in relation to this infant who was given an organo-phospnate-based rodent poison.

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Deliberate self-poisoning was noted in only four children. That emotional and family stresses may play an aetiologic role in accidental childhood poisoning is exemplified by this group of patients. Two of the children came from an unstable family in which the father, a postal worker was a habitual drunkard. The mother, a school-teacher who acknowledged her marital disharmony, admitted she frequently punished the children by caning. In this particular incident, the children were accused by their caretaker, " a housegirl, of stealing some mo-ney from the kitchen. Knowing what awaited them, the older child, an eleven year old boy, ingested rat poison and gave some to his e-eight year old sister before the mother's arrival.. The two vehemently denied taking the money on questioning by the author. The third child, a thirteen year old epileptic, ingested .an unknown number of phenobarbitone tablets. His mother reported he had abnormal behaviour in the form of running away

from home, being aggressive* being abusive. A similar history' was obtained from the fourth child, a twelve year old boy from one of the slums in Nairobi, who ingested an organophosphate compound. Emotional and/or family stress was thus evident in these four patients, who were referred for follow-up by the psychiatrists and the social workers. The mother of the first two children was also referred for family counselling. Although deliberate self poisoning is said to be commoner in girls (5) three out of the four children in this study were boys.

Appropriate first-aid measures were taken to remove the poisons at home in only 25% of the children where applicable. Allingham (6) working in New Zealand found that first aid measures were taken to remove the poisons in less than 50% of his patients. Removal of poisonous agents as soon as possible after they are ingested is definitely beneficial and is to be recommended (7). This is particularly so in developing countries where sparse medical facilities and poor transport may result in long delays in seeking medical care.

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study, only 55% of the poisoned children arrived in hospital within six hours of poison ingestion and long delays were prevalent. As a comparison, Hancock (7) working in the Children's Hospital Sheffield, United Kingdom in 1973, found that 75%

of his patients were in the Casualty Department within 90 minutes of poison ingestion, the median delay being 60 minutes.

There is thus a need to educate the public on the first-aid measures than can be taken to remove the poison at home. The use of milk as a poison diluent is certainly to be encouraged but the induction of vomiting prevalent with kerosene poisoning, as noted in this study is to be discouraged. Fifty five percent of children with kerosene ingestion had vomiting induced. Indeed, emptying the stomach by any means is contra-indicated in children known to have ingested petroleum products or corrosives (21). The use of specific emenagogues, such as syrup of ipecac, was not noted in any of the patients in this study. The safe use of-, and effectiveness of syrup of ipecac at home has been questioned (21), but it is recommended particularly when long delays in seeking medical care are anticipated, and where its indications and correct use are known to the householder. It is the author's opinion that the use of syrup of ipecac should be recommended selectively to our homes and even then only when the clinician is satisfied that the householder fulfils the above-mentioned criteria adequately. Pharyngeal irritation by the

index finger is 100% effective but irritating to the child (24). It is a simple method with minimal side effects that can readily be taught at the primary health care level and it is the author's opinion that it should be taught to the public.

Adequate supervision was the rule rather than the exception, and only in a few instances were the children left unattended. Keeping poisonous substances away from children and not constant vigilance on the child is the most important preventive strategy. This viewpoint was expressed as long ago as 1956 by Jacobziner (23) who while investigating accidental, childhood poisoning in the New York City, found that, in 76% of b\s patients, the mother was at home at the time of pc .son ingestion.

Two deaths were reported representing a mortality .r'1 of 3.6% which is lower than that reported by Bwibo in Uganda (11). It is gratifying to note that majority of the poisoning episodes were of a mild nature but nevertheless, the loss of two children in avoidable accidents spells out the need to tackle this menace at the primary level, that is, prevention.

In the developed countries where alot of research has been carried out with a view to preventing

accidental childhood poisoning, most emphasis has been on making drugs less accessible to the child, mainly because drugs have been their number one culprit. Various methods, such as reducing the quantity of drugs in the house, provision of drug cupboards, safety packaging, proper identification of poisons, making tablets less attractive to children and the education of the public on potential dangers of these drugs have been used either singly or in combination. In the United States of America for example, although the incidence of accidental poisoning in childhood has been on the increase, the mortality has been declining (22). Some of the factors contributing to this decline include the Poison Information Centre, safety packaging, popularisation of syrup of ipecac and adult education. On the other hand, the incidence of accidental poisoning is highest among the poor, with overcrowding, poor housing, inadequate storage and lack of knowledge increasing the hazard (24). For this reason, therefore preventive strategies must be tailored to suit the various communities. After all, some of the prevention methods mentioned above, such as provision of a drug cupboard in every home, may be beyond the financial resources of a developing country. If accidental poisoning is to be prevented, the circumstances surrounding the poison ingestion and the appropriate preventive interventions must be known and be communicated to the public.

This study reveals that accidental poisoning is commonest in 1 - 3 years age group; that household agents are the commonest agents ingested, and that majority of the substances, accidentally ingested are obtained from 'own' house¹ where they are easily accessible to the child. In addition, majority of the medicaments accidentally ingested are obtained on prescription; and that in only a small minority of the poisoned children are appropriate first aid measures taken to remove these poisons at home, although long delays in obtaining medical care are common.

The most important preventive measure in these circumstances is, therefore, health education. health education is to be useful, it must motivate a change in the attitude of the householder as regards keeping poisonous substances away from children, first-measures to take to remove the poisons at home (except when the poison is a petroleum product or a corrosive-), and the need to take poisoned children to hospital without delay.

Kerosene the most frequently ingested substance deserves a special mention. In this study, it was noted that kerosene was mainly put in beer or soda bottles, or in empty open cans. It is the author's opinion that such containers should be discouraged. Indeed the use of food or beverage containers for storing

potentially poisonous substances is to be discouraged (24). The author recommends as an alternative., cheap and readily available container, the plastic containers with caps currently sold in many Kenyan markets. Not only are such containers cost-reducing (by reducing kerosene evaporation) but they also reduce the risk of contaminating other household goods with kerosene in overcrowded situations. Kerosene venders should similarly be encouraged to desist from selling kerosene in food or beverage containers.

Although the prevention of poisoning is of prime importance in lessening the incidence of acute childhood poisoning, the management of the poisoned child can be difficult and challenging. The very high number of children with poisoning resulting from ingestion of medicaments obtained on prescription, decries the need for a concerted effort by the clinicians and the pharmacists, to supply drugs only when necessary and in the correct amounts. It is the author's ⁱ hope that the newly introduced 'pre-packed' drugs supply system in this country will contribute positively towards lessening these poisoning episodes.

The establishment of a Poison Information Centre, would be of immense help to. the clinician, particularly in the rapid identification of

the poison and its toxicological properties, and is certainly to be recommended. In this study, the difficulties of doing toxicological analysis on most of the substances encountered has been cited. In one such instance, two children had ingested a rodent poison under the brand name of "Zelio" containing thallium sulphate, a highly toxic substance (lethal dose in adults 2 mg). These two children caused a lot of anxiety to the clinicians in that although thallium poisoning is a known entity, none of the clinicians had previous experience with the substance, and its toxic manifestations were in the main unknown. It is to be emphasized that such a poison information centre should be complementary to, and not substitute for increased community participation in the prevention of acute childhood poisoning.

Finally, the need for further socio-medical research to identify the magnitude of the problem of acute childhood poisoning in this country cannot be over-emphasized. Only then can we justify spending our limited resources on poison information centres.

CONCLUSIONS;

This study has demonstrated that:-

1. Acute accidental childhood poisoning is mainly a problem of the under five age group (73%), the peak age being 1 - 2 years (33%). There is a male to female preponderance in an approximate ratio of 2:1.
2. The commonest poisoning agents are Household Agents (36%), medicaments (32%) and food and plant agents (24%).
3. The most important factor in childhood poisoning is that the poisoning agents are easily accessible to the child. 83% of all poisoning agents were obtained from-inside 'own home'.
4. Kerosene is the most frequently ingested household agent followed by organophosphate based compounds such as insecticides, 100% of the children with kerosene ingestion obtained it from inside 'own'home'.
5. In 79% of children with accidental poisoning with medicaments the drugs were obtained on prescription. Anticonvulsants/Tranquilizers were the commonest medicaments ingested.

6. Majority of the other poisoning episodes, namely food and plant poisoning, alcoholic intoxication and carbon monoxide poisoning occurred either in groups or families and were mainly of 'unavoidable' nature.
7. Only 25% of the children had 'appropriate* first-aid measures taken to remove the poisons at home where applicable. Five out of 6 children with kerosene ingestion who received first-aid at home had vomiting induced.
8. There was a mortality of 3.6% (2 children) and-the deaths resulted from ingestion of medicaments.

RECOMMENDATIONS:

From the observations of this study, the following recommendations are made:-

- ^ Community participation should be enlisted in the prevention of accidental childhood poisoning by health education. Some of the more important points that should be highlighted in health education are as follows:-
- A Keep all drugs, known poisons and other chemicals out of reach of children, preferably under lock and key. Discard all 'old' and 'unused' drugs immediately and safely.
 - B Do not put potentially poisonous substances, such as kerosene, in food or beverage containers. Store kerosene out of reach of children preferably in a plastic container with a cap.
 - C Discourage children from eating unknown plants or drinking unknown liquids unless with the approval of an adult. Discourage children from drinking from half-empty containers or ingesting discarded tablets while in play.
 - D. Ensure adequate ventilation when using the charcoal burner and put it off at bedtime.
 - E When using pesticides and insecticide avoid inhalation, or excessive contact with skin, or contamination of food.

Attempts should be made to remove immediately all known or suspected poisonous agents ingested by children except when such substances are suspected to be corrosives, such as acids, or hydrocarbons such as kerosene. A simple method of inducing vomiting involves pharyngeal irritation with the index finger. All children with known or suspected poisoning should be taken to hospital without delay.

There is need for a Poison Information Centre for the prompt identification of the various poisons and their toxicological properties to assist the clinician in the management of the poisoned child.

Further socio-medical research to identify the magnitude of the problem of acute childhood poisoning and associated factors is also recommended.

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QUESTIONNAIRE A

CHILDHOOD POISONING SURVEY: DATA SHEET
ON POISON INGESTED.

Name_____IP. No.

- 2, Source of information: State the relation of the interviewee to the child e.g. neighbour.

4. Poison ingested known Unknow n....

5. If poison is known:
 - a) name of the poison
 - b) sample brought to hospital Yes No

6. If poisoning is unknown, sample brought to the hospital
Yes No.

7. Has anybody else ingested the poison?
Yes No

8. If yes, specify who else

9. Source of the poison
 - Inside the house
 - Outside the house
 - Unknown
 - Other specify

- Ob. If inside the house where was the poison located:
 - Floor
 - Table
 - Low shelf
 - Unlocked cupboard
 - mother's handbag
 - Others specify

10. Poison container
 - Hospital bottles
 - ..Hospital wrappings
 - ..Duka medicinal bottles
 - Duka wrappings
 - Refreshment bottles - specify e.g. Soda or beer bottle
 - ..Not. known
 - . Others - specify

11. Appearance of ingested poison

Coloured
 Colourless ie.g. kerosene
 plain white

12. If poison is a medicament

A. Source of the medicine

..... Hospital/bought on prescription
 Shops without prescription
 Others - specify

B. Users of the medicine

Parents
 Child
 Other siblings
 Others - specify

C. Specify ailment for which medicine was being used

Diarrhoea
 Headache
 . . . Fever
 Cough
 _____ Vomiting
 Others specify
 running nose

13. Who administered the poison:

m

..... Medical practitioner
 ;.....«,.. Traditional practitioner
 ; Parent/s
 Neighbour
 Older sibling
 Houseboy/housegirl
 Self administered by child
 Others - specify

14. If self-administered by child

.°o..... poison within easy reach e.g table, floor
 shelf, open cupboard
 Outdoor misadventures such as drinking
 from empty containers
 Others - specify

15o First aid measures taken to remove the poison
e«*e(it« YGS «••••o• ^0

16. If yes, specify e.g. vomiting induced

17. Were the first aid measures taken appropriate
for the poison ingested Yes. No
e.g. inducing vomiting in Kerosene ingestion.

18. Who was in charge of the child at the time
of poison ingestion - specify e.g. neighbour

19. Number of children in the family

20. Occupational/social/family background

both parents employed

..... both parents in business

..... one parent only employed or in busin

single parent family - mother....

father....

QUESTIONNAIRE B:CHILDHOOD POISONING SURVEY
DATA SHEET ON CLINICAL PRESENTATION

1. NAME IP NO SEX
AGE WEIGHT HEIGHT

2. Date and time of poison ingestion

3. Date and time when first seen

Smell suggestive of ingested agent
present - specify e.g. kerosene, alcohol
absent

Vital signs

Pulse RR TEMP BP

Symptoms and signs tick wherever applicable-

CNS	GIT	RS
, Agitation	mough burns	Hyperventilat
Ataxia	. Salivation	Hypoventilat
Coma	Abd. pain	Dysphoea
Headache	Nausea	Coughing
.... Lethargy	Vomiting	Cyanosis
Paralysis	Diarrhoea	Rales
Seizures		
Stupor		
Tinnitus		

CVS

EYE

SKIN

Hypotension	Conjunctivitis	Bruises
Hypotension	Diplopia	. Burn
Bradycaria	. Miosis	, . Dermatitis
Tachycaria	« Mydinasis	, .. Sweating
Arrhythmiias .. ,	Nystagmus	, Jaundice
tCher findings - specify		

Clinical Diagnosis e.g. Kerosene ingestion without
features of toxicity kerosene poisoning

8,, Recommended treatment - specify e.g.
gastric lavage, reassurance, atropine etc

9. Any investigations done- Yes No

If yes specify Results

Gastric aspirate

..... Blood poison levels

Blood - U/E

Urinalysis

..... Chest X-ray

Blood sugar

..... Others - specify with results

10. Final Diagnosis based on clinical and laboratory data

11. Outcome

..... Treated and Discharged

Admitted

..... Expired'

12,, Complications if any specify