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PATTERNS OF POISONING AMONG PATIENTS AGED 0-13 YEARS AT A PAEDIATRIC HOSPITAL IN NAIROBI

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## PATTERNS OF POISONING AMONG PATIENTS AGED 0-13 YEARS AT A PAEDIATRIC HOSPITAL IN NAIROBI

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### ABSTRACT

**Objectives:** To determine the pattern of poisoning amongst patients admitted at a paediatric hospital in Nairobi and compare it with that of other hospitals around the world

**Design:** A retrospective hospital based multivariate study.

**Setting:** Gertrude's Garden Children's Hospital, Nairobi, Kenya.

**Subjects:** Medical records of all children admitted with a diagnosis of poisoning between January 2003 and December 2007

**Results:** The age range of the study population was birth to 13 years. The mean age was 3.57 years with a standard deviation of  $\pm 1.57$  with a peak incidence in the one to three years old age group (56.7%). Males comprised 61.7% of the cases. The most common cause of poisoning was ingestion of a drug (46.7%). Petroleum products caused 30.0%, detergents 8.3% and organophosphates 6.7%. Ninety six point seven percent of poisonings were unintentional and 93.3% of injuries took place at home. There were no mortalities.

**Conclusion:** The majority of these incidents were preventable. Measures need to be instituted to reduce the number of incidents of poisoning in children. This can take the form of health and safety education particularly in relation to storage of common household poisons.

### INTRODUCTION

Children are naturally curious and adventurous which results in thousands of children being admitted to emergency departments worldwide following accidental ingestion of household products, medicines, pesticides and other substances. Most of these poisonings are preventable.

Of the approximately 830,000 child deaths (1) that occur worldwide every year, poisoning is reported to fall among the five leading causes of unintentional injury to children; the others are road traffic injuries, drowning, burns and falls. In the African region, poisoning accounts for 7% of unintentional injury deaths (2). According to the WHO Global Burden of Disease project, an estimated 345 814 people of all ages died worldwide as a result of "accidental" poisoning in 2004. Although the majority of these accidental poisonings were among adults, more than 10% of people who die from poisoning are children and teenagers (1). It is estimated that 125 children

and teenagers die from poisoning every day.

Acute poisoning accounted for an estimated 45 000 deaths annually in children and young people under the age of 20 years (1). The global death rate from poisonings for children younger than 20 years is 1.8 per 100 000 population. The rate for high-income countries is 0.5 per 100 000 while for low-income and middle income countries it is four times higher, at 2.0 per 100 000.

Poisoning death rates are highest in infants less than 12 months of age however the incidence of poisoning cases is generally higher in the older age groups (3, 4). Indeed non-fatal poisoning appears to be more common among children aged 1 to 4 years (5). In a hospital-based study in four low-income and middle-income countries, only 2% of poisonings occurred in children under one year of age, compared with 54% in the one to four year age group (6). The fatality rate among older children admitted to hospital following accidental poisoning is generally less than 1% (7, 8). The higher mortality rate in very young

infants may be explained by the greater susceptibility of the infant body to damage by toxins.

Because these injuries usually occur in young healthy individuals, the number of years lived with disability as the result of poisoning is large. According to the World Health Organization, up to 50% of young children with unintentional injuries that present to a hospital are left with some form of disability (1). Deaths represent just a small proportion of the injury burden compared to non fatal health outcomes. A substantially higher number of injuries result in potentially life-long disability, psychological trauma, and attendant financial and economic burden. This study set about to determine the pattern of poisoning amongst patients admitted at a paediatric hospital in Nairobi and compare it with global patterns.

#### MATERIALS AND METHODS

This study was conducted at the Gertrudes Garden Childrens Hospital in Nairobi. Although this hospital is located in a relatively affluent area of Nairobi, it serves a varied socio-economic population not just locally but also regionally including some cases from neighbouring countries due to its good reputation. The hospital is a busy non-profit making private institution managed by a trust and is located about

seven kilometers from the Nairobi central business district. The data were collected for the period January 2003 to December 2007. The study design was a retrospective hospital based multivariate study. Only children aged birth to 13 years were included. Data were collected using validated questionnaires and analysed using SPSS PC statistical software. The data were summarised using frequency tables, means and standard deviations for the different variables.

#### RESULTS

In the period 2003 to 2007 there were 1033 cases between the ages of zero to thirteen years admitted due to injury. Of these 60 were a result of poisoning making up 5.8% of injury admissions.

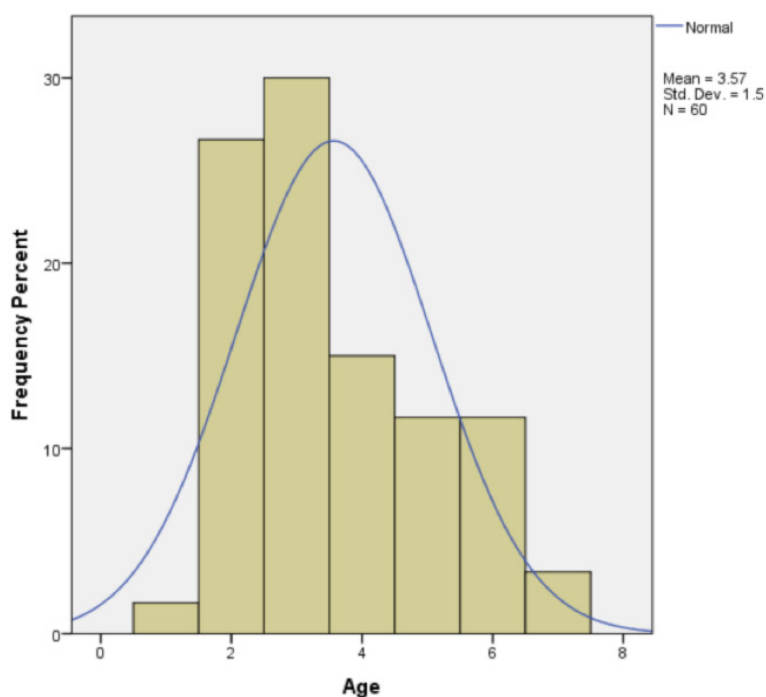
Thus a total of 60 children aged zero to thirteen years were eligible for inclusion in this study. Males made up 61.7% of the total giving a Male to Female ratio of 1.6:1. There were no mortalities.

The mean age was 3.57 years with a standard deviation of  $\pm 1.5$  years. Peak incidence was in the two to three year age group ( 18 of 60) making up 30% of the total closely followed by the one to two year old age group with (16 of 60) 26.7%. Thus together, children aged one to three comprised over half of the cases (56.7%.)

**Table 1**  
Age

Age	Frequency	Percent	Valid Percent	Cumulative Percent
< 12 months	1	1.7	1.7	1.7
12-23 months	16	26.7	26.7	28.3
24-35 months	18	30.0	30.0	58.3
36-47 months	9	15.0	15.0	73.3
48-59 months	7	11.7	11.7	85.0
60-119 months	7	11.7	11.7	96.7
120-167 months	2	3.3	3.3	100.0
Total	60	100.0	100.0	

**Figure 1**  
*Poisoning- Age Distribution*



*Substance:* Twenty eight cases of poisoning were due to ingestion of a drug/ overdose. Eighteen were due to paraffin and other petroleum products, five due to detergent, four due to organophosphates and three due to drug intolerance/ allergic reaction. In two of cases, the substance involved was not known.

**Table 2**  
*Ingested Substance*

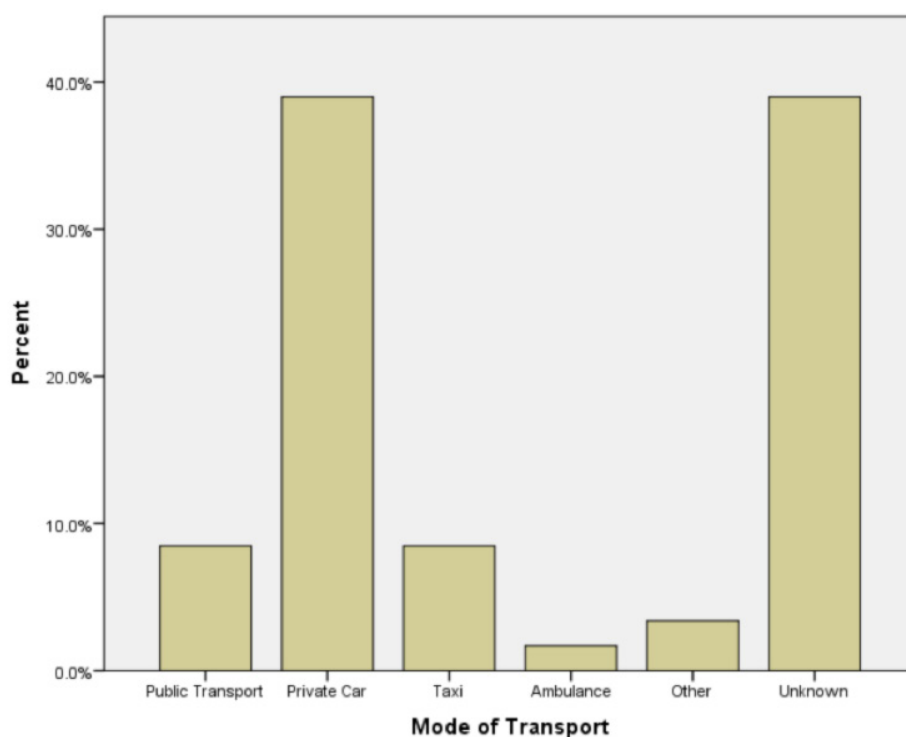
Substance	Frequency	Percent	Valid Percent	Cumulative Percent
Ingestion of Drug/ Overdose	28	46.7	46.7	46.7
Organophosphate	4	6.7	6.7	53.3
Detergent	5	8.3	8.3	61.7
Paraffin	18	30.0	30.0	91.7
Drug Intolerance/ Allergic Reaction	3	5.0	5.0	96.7
Other				
2	3.3	3.3	100.0	
Total	60	100.0	100.0	

*Residence and Mode of transport:* Twenty patients (33.9%) were from Eastlands, 14 (23.7%) from Westlands and 15 (25.4%) out of Nairobi. The remainder were from Southlands (5.1%) and out of Kenya (1.7%). Residence was unknown in 10.1%.

The majority of affected children were

transported to the hospital by private car comprising 23 cases (38.3%). The other modes were public transport for seven cases (11.7%) and taxi for five cases (8.3%). Ambulance accounted for only one case (1.7%). Mode of transport was unknown in 23 cases (38.3%).

**Figure 2**  
*Mode of Transport*



#### *Miscellaneous findings*

*Place of occurrence:* Ninety three point three percent of ingestions took place in the home.

*Intent:* Fifty eight of the poisonings (96.7%) were unintentional

*Eyewitness:* An eye witness was present in only nine of the cases. Of the eyewitnesses, the most common was a parent in five cases, the house help in one case and other people in three of cases.

*Supervision:* The child was under supervision in six of the cases. Of these, the most common supervisor was a parent in three cases and the house help in two cases.

*First aid:* First aid was recorded to have been administered in ten cases. In four out of the ten cases (40.0%) it was done by a parent, in three cases (30%) at a nearby clinic or health centre. The person who administered the first aid was unknown in three cases (30%).

*Outcome:* One hundred percent of patients were recorded to have been treated and discharged. There were no mortalities

## DISCUSSION

Poisoning is a major cause of injury related morbidity and mortality in children and is largely preventable. Most data on poisoning discusses fatal outcomes whilst non fatal poisoning data is not readily available especially from Low Income countries.

In this study 5.8% of all injury admission cases aged between 0 and 13 years were due to poisoning as compared to a study in Cyprus that had 3% and a study in Istanbul at 11% (9, 10).

Poisoning is thus a significant cause of morbidity and requires attention.

In this study the most common cause of poisoning was drug ingestion whilst at home. This is similar to studies done in the U.S.A, Turkey and Cyprus (9, 10, 11).

This is clearly preventable and indicates a need for education on safe storage of medications, child proof containers and clear instructions to care givers.

Children on short term complex medicine regimes may need to be admitted for safety purposes even if they may not be very ill.

Peak poisoning was between the ages of one and three which is similar to a WHO study done in four developing countries. This study also showed that organ system injury was the most common severe consequence of accidental poisoning with no reported deaths (8).

In a study done in the United States (11) it was suggested that poisoning increases in incidence during the imitative phase of a child's life. This may motivate parents to be more cautious during these ages and prevent some injury.

Generally most studies record a higher incidence in males but there are instances when the incidence has been equal (12).

Paraffin (petroleum products) ingestion was the second leading cause of poisoning in this study which was in contrast to developed countries which have a relatively low incidence of poisoning from this cause. This is probably due to the use of crude forms of energy in this region and the poor storage of these products in containers attractive to children such as soda bottles. Paraffin ingestion remains a leading cause of poisoning in some developing countries as demonstrated by a study in South Africa (14).

Although the benefits of simple preventive measures such as child-resistant containers and the cost burden of hospital admissions have been demonstrated, (15, 16) petroleum products especially paraffin remain a leading cause of poisoning.

Organophosphates and detergents were next followed by allergic reactions which accounted for 5% of the total.

Drug intolerance is the least common cause of poisoning according to the study and is not a mentioned factor in other developed countries.

The data collection tool was not sufficiently sensitive to statistically determine the socio-economic status of the patients. We noted however that the hospital is located in a relatively wealthy suburb of Nairobi and although public transport is available, the hospital is not as accessible when compared to for example the National referral hospital. Interestingly the hospital services were accessed by a wide variety of near and far housing localities without an easily discernible pattern of low, middle and high income localities.

While majority of the patients were from nearby communities of Eastlands and Westlands, there were still a significant number of patients from Southlands and even out of Nairobi with distances ranging from 50 to 100 kilometres. This may indicate a lack of evenly distributed healthcare within the region and the country. It may also indicate a lack of specialised paediatric centres resulting in referral to this hospital.

Although the numbers were small, we got an anecdotal impression that there was insufficient supervision of these children and very few had first AID administered at the site of poisoning. This may reflect a need for more widespread basic training in First Aid. It is also a challenge to urban communities where parents have to leave their children in order to go to work.

The main mode of transport to the hospital was via a private car with a very small percentage using an ambulance (1.7%). This is indicative of lack of adequate accident and emergency services within the region and should be looked into as a cause of increased morbidity and mortality due to lack of professional emergency transport.

The outcome for patients in this study was very

good, with the majority being discharged and going on to lead normal lives. This may indicate good quality of healthcare. It may however also suggest that children who suffer severe poisoning do not make it to the centre.

Of note is that there were no mortalities recorded in this study. The probable reason for this is that during the period that this datum was collected, the paediatric ICU did not admit very critical cases. These were either rerouted or referred to other health facilities and not admitted to Gertrudes.

*Limitations:* were at play such as the occasional incomplete data in some files

## CONCLUSION

Data on poisoning from developing countries and especially Africa is relatively scanty but from the data that is available, this is obviously a serious problem. WHO reports indicate that the problem although still serious is improving, there are fewer accidental poisonings which is probably a result of concerted injury prevention efforts.

It is also evident that majority of poisoning is preventable and studies have shown that the main cause of accidental poisoning is related to availability and accessibility of the substance involved (17).

We recommend that poisoning prevention policies be formulated and adopted, this would include adequate training and campaigns to increase awareness, proper labelling and storage of poisonous substances, child resistant packaging.

Good timely management of affected children should also be incorporated. Poison call centres should be set up. Establishing community based child care services would ensure better supervision of children of busy parents.

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