

A Retrospective Study of Poisoning at Muhimbili National Hospital in Dar-Es Salaam, Tanzania

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Abstract- Introduction: Poisoning is a public health challenge in low and middle income countries. Advances in technology and social development have led to an extensive use of medicines and chemical substances in these countries, hence increasing the prevalence of poisoning. Success in the management of a poisoning case depends on a number of factors including the availability of trained personnel, availability of support information and the understanding of local context. There is paucity of evidence from Tanzania showing the causes and management of reported cases of poisoning in healthcare facilities.

Methodology: A retrospective cross-sectional study which was conducted at Muhimbili National Hospital, in Dar es Salaam. Data were collected by review of files of patient who were admitted due to poisoning for the past three years (2005-2008) and in-depth interviews with key informants using pre-tested semi-structured interview guides.

Results: A total of 215 patients were admitted due to poisoning during the study period, 123 were males and 92 were females. Prevalence of poisoning was 3.28 cases per 1,000 hospitalizations. Majority of poisoning cases were observed in the age group between 16-40 years (>80%). Intentional poisoning by others was the most common pattern of poisoning (>36%). In more than 50% of the cases the poisoning substances had not been identified. Antibiotics and antiparasitics were the common medicines implicated in poisonings (17%). More than 90% of the poisoning victims recovered. Major fatalities occurred in the age group between 26-40 years at 58%. The mortality rate in men was higher giving a male to female ratio of 10:1. None of the healthcare personnel interviewed had received any specialized training on poisoning. Main sources of information mentioned included Drug Information reference formulary and senior colleagues. Increasing public awareness, availability of resources and organizational restructuring, and provision of specialized training are likely to have positive impact on poisoning management.

Conclusion: Poisoning is one of the causes of hospital admission and mortalities at Muhimbili National Hospital. Effective management of poisoning cases is a multidisciplinary team approach which can be improved by several interventions such as establishment of poison information center, training of healthcare providers and ensuring easy access to anti-dotes.

Keywords- *Poisoning; Hospital Management; Poison Information Centre; Antidote*

I. INTRODUCTION

Poisoning is a qualitative term used to define the potential of a chemical substance acting adversely or deleteriously on the body by interfering with normal body functions after it is swallowed, inhaled, injected, or absorbed ^[1]. Poisoning may occur either intentionally or unintentionally. Intentional poisoning is the result of a person taking or giving a substance with the intention of causing harm while unintentional poisoning occurs if a person taking or giving a substance did not mean to cause harm. Unintentional poisoning includes the use of drugs or chemicals for recreational purposes in excessive amounts. When the distinction between intentional and unintentional is unclear, poisonings are usually regarded “undetermined” in intent ^[2]. It has been shown that consequences of deliberate self-poisoning outweigh those of accidental poisoning by far ^[3]. In addition to use of pesticides, poisoning can also result from an intentional or unintentional overdose of medicinal drugs either prescribed or bought over the counter.

World Health Organization (WHO) estimate that intentional and unintentional injuries constitute about 6.8% (770,000) of all deaths in low and middle income countries. Poisoning is responsible for about 8.5% (42,000) of these unintentional deaths due to injuries and self-inflicted injuries is responsible for about 18.3% (50,000) of the deaths due to intentional injuries (273,000) ^[4]. A recent study in US reported an unprecedented increase in number of intentional and unintentional drug induced deaths ^[5]. Poisoning is very common in the developing countries, and because of the weak regulations and poor healthcare services the consequences of poisoning are much worse than in the developed world. Pesticides are the most common chemicals used to inflict self harm in developing countries ^[6]. In Sri-Lanka, studies have shown that there are more than 160 hospital admissions for severe pesticide poisoning per 100,000 inhabitants per year ^[7]. Incidences of poisoning have also been reported in parts of Africa. For example Organophosphate (OP) pesticides were responsible for the majority of deaths in most series of self - poisoning cases, particularly those from rural areas have also been reported in Ethiopia ^[8], Kenya ^[9] and South Africa ^[10-12]

Poisoning is a common health problem in Tanzania as well. In 2006, about 28,000 and 71,500 out-patient cases of poisoning among children under the age of five and those aged five years and above were recorded all over the country ^[13]. In the same year about 27,300 children under the age of five years and 9,000 among those aged five years and above were admitted in various healthcare facilities due to poisoning. About 1,700 deaths due to poisoning were recorded, representing an

average of 3.7% of all deaths^[13]. Cases of poisoning are expected to increase substantially with the increasing intensification of agriculture accompanied with the widespread use of pesticides in Africa^[14].

Medicines are relatively safe at their therapeutic ranges, however can induce dangerous toxicities in the body when used inappropriately. Self-medication is a common practice in Tanzania due to unrestricted access even to prescription- only-medicines hence increasing the likelihood of drug induced poisoning^[15, 16]. The problem of unrestricted access to medicines and poisons is compounded by lack of knowledge and awareness among the users on the dangers of these chemicals. Even though poisoning contributes significantly on the disease burden, there is little evidence in the literature exploring the causes and management of poisoning. This study therefore reports the incidences, causes and management of poisoning at Muhimbili National Hospital, in Dar es Salaam, eastern Tanzania.

II. METHODS

A. Study Design and Setting

This was a retrospective cross sectional study which was conducted at Muhimbili National Hospital in Dar es Salaam, Tanzania. Muhimbili is a National Referral hospital and university teaching hospital, with about 1,500 bed capacity. The hospital is located in Dar es Salaam, the main business centre for the country. Dar es Salaam was projected to have been inhabited by 3.1 million people by year 2007^[17]. Today the city is believed to be inhabited by around 5 million people

B. Data Collection

Data were collected by reviewing patient file records from the hospital database over a three (3) year period (2005-2008) and in-depth interviews with key informants using pre-tested semi-structured interview guide. Interviews were recorded by digital audio recorder. Key informants included the nurses, doctors and pharmacists. The sample size was determined on assumption that the dominant characteristics of the study would occur in about 50% of the cases to maximize the sample, and confidence interval set at 95% level. Based on these assumptions, 400 patients seen at the casualty department during the three year period were supposed to include in the study but unfortunately only 215 patient records could be retrieved and studied.

C. Data Analysis

Digital audio recorder was played several times so that the researchers could be familiarized with the contents of the conversations before transcription process. All the transcripts were loaded into Atlas.ti ver. 7.2, (ATLAS.ti Scientific Software Development GmbH, Berlin-Germany) a computer assisted qualitative data analysis software programme which was used to sub-divide these key areas (coding categories) into codes; representing segments which reflect a more refined and detailed representation of the meaning of a quotation from the respondents. After the process of coding a codebook was developed defining coding used and finally the networks for each key area were generated from the Atlas.ti as presented in narration in results section. Quantitative data were checked for completeness then double entered into Epi-data before exportation into SPSS Ver 15 for analysis.

D. Data Validity

To ensure data validity, study participants were ensured of the purpose of the study and non-disclosure of their identity. All conversations were recorded with the consent of the interviewees to avoid losing key messages. Data from the interviews were triangulated with patient file reviews.

E. Ethical Clearance

Ethical clearance was sought from MUHAS Ethical review committee and the permission to conduct the study at the hospital was sought from the hospital administration. Key informants were asked for verbal informed consent prior to the interviews.

III. RESULTS

A. Issues Which Emerged from the Interviews

1) Nature of Poisoning Cases Attended at MNH:

The nature of poisoning cases encountered by the health personnel's in their time span at MNH included accidental, self intentional and intentionally poisoned by others with the intention of causing harm to an individual who is unaware of the situation. According to the study participants the most frequent cases of accidental poisoning were due to drug overdoses which results from lack of information and education, human carelessness, negligence and ignorance, of which sulphadoxine-pyrimethamine, artemether-lumefantrine, and ceftriaxone were most common. Food poisoning, snake bites and ingestion of kerosene and other chemicals by children due to their tendency to touch, test and explore surroundings. Reasons for self intentional poisoning were found to be due to shattered love affairs especially amongst the girls, unwanted pregnancies where the woman exposed herself and the developing foetus to effects of chemicals i.e. Rat poison and also a case where a girl was

found by the mother having an affair. Cases of intentionally poisoned were also reported by 2 of the respondents which was of a married couple whose drinks were mixed with sedative drugs by a friend who later stole some of their properties.

2) Training Needs:

Professionals play an important role in the treatment and prevention of toxic exposures and so need through knowledge. Training is needed to ensure that everyone involved has a good understanding and through grasp of their role as well as specific information on the problem and its consequences. Areas of training include: general awareness of toxic substance, emergency response situations and could include a training seminars for doctor, nurses and pharmacists to share experience through case studies, presentations, and discussions. None of the health care personnel had received any specialized training, but had some knowledge on poisoning from their pre-service training and they also had not been given any presentation on poisoning cases i.e. no on job training as quoted from one of the doctors when asked if he had received specialized training:"

"No, I just read some pamphlets on how to manage pesticides, and poisoning involving chemical substances." IDE respondent

3) Sources of Support Information:

It was revealed that the hospital drug information unit provides information when needed. Its main sources of information included but not limited to Drug Information reference, Pharmaceutical codex, and British National Formulary, moreover the later is used by doctors when complicated case arrives. In addition they publish handouts to provide information to attendants and nurses, have as well the responsibility of ensuring use of correct anti-venom for snake poisoning cases. The Drug Information Unit is also involved in creating awareness of the drug information existence and functions along with ensuring that they are informed when trouble arise. When facing a complicated case, supervision and guidance can be obtained from senior colleague.

4) Challenges Facing Management of Poisoning Cases:

One of the significant challenges faced by the informants is establishing the drug/chemical used in the case they are handling, this outcome is due to unawareness or unwillingness of the patient to inform of the chemical or drug ingested, and at many times the patients are in a state of lethargic drowsiness and are unconscious or even in state of coma, making it difficult to obtain any information from them and this makes it complicated to give an appropriate antidote. There is the problem of lack of adequate resources, in terms of insufficient reference material due to their costly nature making it difficult to acquire them, in this sense funding is also one of the challenges which has to be overcome in order to have an efficient system, inadequate infrastructure is a drawback, every ward is required to have a drug information personnel, where as in the present situation there are only 3 drug information personnel in the entire hospital. Inadequate availability of antidotes for the poisoning cases management has been noted more so in the case of snake poisoning where at times when anti-venom is not present, tetanus toxoid, antibiotics and cleaning up of the wounds is done. And in absence of these antidotes the health personnel generally follow the ABC approach for treatment, i.e. Establishing airway, suction and putting i.v. lines, but here a concern for not being able to carry out gastric lavage was raised too. Lack of awareness among medical personnel on how to use the drug information unit resourcefully was also reported as quoted from the drug information pharmacist.

"The challenges that medical personnel face are they don't know how to use the drug information unit, awareness is one of the problems, they are not aware, but of course it is our responsibility to educate them and so we have started" IDE respondent

A further challenge is the needs identified, the informants believed that in the presence of knowledge and all the required material, and they can manage poisoning cases.

5) Efficient Poisoning Management:

Most of the respondents interviewed are of the opinions that effective management of poisoning cases included specialized training; the informants felt that they should be appointed for a month or so to attend special courses for management of toxicology cases. They also believe that a teamwork approach is needed between the doctors, nurses, pharmacists, lab technologists, the patient, the relatives and eyewitnesses who can provide resourceful information that can aid in managing poison cases. A quick forensic laboratory test results will assist in detection of the poison taken resulting into successful management of the case. Increasing availability of resources, in terms of antidote, oxygen, gastric lavage facilities, ant venom supply especially in the rural areas and in general sufficient medications are some of the proposed ways to effectively manage poisoning case.

B. Issues from Review of Records

1) Demographic Features and Prevalence of Poisoning:

A total of 132,458 patients were admitted during the three year period in different wards of the hospital and 435 patients were admitted due to poisoning. This figure constituted a prevalence of 3.28 cases per 1,000 hospitalizations. Out of these only 215 records could be retrieved from archive the rest were either missing or misplaced. This incidence rate does not include outpatient poisoning cases, since there were no available records. The age of the patients varied from 0 to 67 years. The

majority of poisoning cases were observed in the age group 16-40 years which accounted for more than 80% of all the poisoning admissions, with the median age range being in the age group 16-25. The least number of poisoning cases were noticed in the age group 61-80 which accounted for about 1% of the total cases. There were gender differences in peak incidence of poisoning; as females formed the majority in the age group 16 – 25 while males were the majority in the age group 26 -40.

2) Causes of Poisoning:

This study shows that the most common pattern of poisoning was intentional poisoning by others (36.3%), followed by suicidal attempts (27%), and accidental poisoning (26.5%). About 10% of all of the poisoning admissions were of undetermined intent. Accidental poisoning was more frequent in females and intentional poisoning by others was more common among the males. Accidental poisoning accounted for 80% of the admissions for the age group of 0-15 years. Table 1 shows the most common substances reported to have been used for poisoning which ranged from illicit drugs to corrosive chemicals such as acid (from motorcar batteries) and kerosene. It was also found out that about two thirds of all poisoning cases were attended during the study period, the causative agents could not be established either by the patient or the clinical staff. The use of house hold chemicals such as rat poisons was the next most frequently reported as being used for poisoning followed by medicinal drugs and corrosive chemicals. In some cases a combination of two types was seen, the greatest predominance being of medicinal drugs and alcohol poisoning, also chemical and drug poisoning combination were reportedly used in the cases that were reviewed in this study.

TABLE I SUBSTANCES REPORTEDLY USED FOR POISONING

Type of poison	Frequency	Percent	Cumulative Percent
Unknown	144	67.0	67.0
illicit drugs	8	3.7	70.7
Medicinal drugs	15	7.0	77.7
Rat poison/Organophosphate	20	9.3	87.0
Corrosive Chemicals	8	3.7	90.7
Others: Combinations	20	9.3	100.0
Total	215		100.0

3) Poisoning outcome

About 90.2% of the patients who were reported to have been poisoned, recovered and 5.6% lost their lives. Deaths were not reported among children under the age of five years. The majority of the fatality occurred in the age group (26-40) which accounts for 58.3% of the deaths occurred in this study. Recovery among those aged 61-80 years was 66.7% and 38.6% among those aged 16-25 years. Females have a higher chance of recovery than males, 97.8% versus 84.6%. The mortality rate in men was higher giving a male female ratio of 10:1. More men (6.5%) left the hospital without approval of the Doctors in charge than females (1.1%).

TABLE II THE CROSS TABULATION OF POISONING PATTERN WITH THE OUTCOME

The poisoning pattern	Outcome of poisoning case management			Total
	Recovered	Died	Others	
Accidental poisoning	53 (93.0%)	2 (3.5%)	2 (3.5%)	57 (26.5%)
Self Intentional poisoning	52 (89.6%)	2 (3.5%)	4 (6.9%)	58 (27.0%)
Undetermined causes	17 (77.3%)	4 (18.1%)	1 (4.6%)	22 (10.2%)
Intentionally poisoning by others	72 (92.3%)	4 (5.1%)	2 (2.6%)	78 (36.3%)
Total	194 (90.2%)	12 (5.6%)	9 (4.2%)	215 (100.0%)

In accidental poisoning 93.0% of the patients recovered, similarly in intentionally poisoned by others 92.3% recovered, where as 89.6% of self intentional poisoning recovered and 77.3% of undetermined cause recovered. The highest mortality rate was observed in undetermined causes with a rate of 18.1% and the least was observed in accidental and self intentional poisoning in which 3.5% of patients died respectively. In patients who had self intentionally poisoned 6.9% of them left the hospital without approval, which is the highest percent of patients who left the hospital unauthorized as compared to other poisoning patterns. This may be due to reasons of fear of consequences.

IV. DISCUSSION

The study shows that poisoning is a public health problem in Tanzania in which men are more vulnerable than females. The risk seems to be grater in males aged 26-40 and females aged 16-25 years. Young adults are at more risk than children or older people. Children under 15 years of age accounted for 9.3% of all cases in contrast to 90.7% of the adults. This finding is consistent with what have been documented countrywide where the number of poisoning cases reported among those aged five years and above were almost three times compared to those under the age of five years^[8]. Similar findings have been reported elsewhere. In a study, which was carried out in the USA about 24.5% of the poisoning cases were seen in children less than 12 years of age and 75.5% occurred in adults Studies conducted in Babol, Iran showed that 22% of acute drug poisoning occurred in the under 15 years of age group and the remaining occurred in the older ages^[18]. One would expect more cases to be in children since they have tendencies to explore the surroundings by putting everything in their mouths without the knowledge to

discriminate between dangerous and safe products. However another study from US has shown an opposite trend where 72% of the total cases of poisoning occurred in under-five years of age and 13% in the 5-12 years age group (totally 85%) and the remaining 15% occurred in adults^[19].

More than 50% of the substances implicated in poisoning cases were not identified. This reflects lack of capacity and technology in toxicological assessment of cases in the healthcare systems of developing countries. In US, reports have shown that an increased use of prescription drugs such as opioid analgesics and benzodiazepines are associated with increased mortalities due to poisonings^[5]. Poisonings due to benzodiazepines were comparable to those of opioid analgesics^[20].

To prevent such incidents, it is recommended that wide-spread community education should be implemented to increase popular awareness of the danger of these compounds and to stress to parents to keep chemicals and medications out of reach of young children.

V. CONCLUSION

In this study, we have identified several risk factors and causative agents for poisoning in patients admitted at Muhimbili National Hospital over a three years period. Suicide among young adults is a common public health problem. Patients with intentional poisoning must undergo psychiatric consultation during their stay in the hospital for the treatment poisoning. This will minimize the risk of next attempt of self harm. Effective clinical management of poisoning can minimize the mortality. As poisoning is a common medical problem, the clinical management have to be improved by several ways like - establishing a poison information and monitoring centre in different parts of the country, preparing national treatment guidelines and training health care providers and ensuring easy availability of the anti-dotes.

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