

## POISONING IN SAUDI ARABIA: TEN-YEAR EXPERIENCE IN KING KHALED UNIVERSITY HOSPITAL

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The Pharmacy Services Department of King Khalid University Hospital (KKUH) established a poison control service in conjunction with their drug information center in October 1983. The primary goal of the poison information service was to offer expert advice from well-trained clinical pharmacists in the management of poisoning cases throughout the Kingdom of Saudi Arabia. The service was made available 24 hours a day (calls received from 7:30 am to 4:00 pm were managed by the Drug and Poison Information Center [DPIC], while after-hours consultations were managed by on-call clinical pharmacists). Information on poisoning management was targeted towards physicians, even though advice was also available to other paramedical personnel and the lay public.

A retrospective study of poisoning cases received between October 1986 and October 1996 was undertaken to ascertain the fulfilment of initial goals, determine areas of weakness, and identify any trends in the poisoning cases received at our center. This was critical to help improve the service and increase physician and pharmacist awareness of poisoning trends. We believe that this is the first practical study to evaluate the pattern of poisoning in the country based on factual data. It was not possible to assess the quality of the services extensively or its impact on outcome, since follow-up information was not available. Patients were admitted for a short period of time, especially those from rural areas. Treating physicians were not available for comments on the follow-up of the patients. Moreover, once the patients move from the Accident and Emergency Department, it becomes difficult to track them. The only exceptions were the critical cases that we were able to follow until either complete recovery or demise.

### Methodology

Information on poisoning cases was entered into a computer database program (FoxPro). Statistical analysis was performed using Stat Graphics. Recorded information included: 1) address and status of the caller; 2) time of the

call; 3) age and sex of the victim; 4) type of toxin and quantity; 5) route and time of ingestion or exposure; 6) time of hospitalization; 7) medical management administered prior to DPIC consultation; 9) recommended management; and 10) predicted outcome.

### Results

A total of 9584 cases were managed over the past 10-year study period. Of these, 90.8% were from the Riyadh area and the majority (29%) originated from the King Khalid University Hospital. Other area hospitals utilizing the DPIC included Sulaimania Hospital (17%), Security Forces Hospital (13%), King Abdulaziz Hospital (8%), Riyadh Central Hospital (6.3%), Prince Salman Hospital (2%), King Fahad National Guard Hospital (1.2%), King Khalid Eye Specialist Hospital and the Maternity Hospital (less than 1%), unspecified private hospitals and clinics (7.5%), and other hospitals (4.7%). Only 9.2% of the cases originated from areas outside Riyadh, and these included Jeddah, Al-Baha, Jizan, Tabouk, Taif, and other areas in the Eastern Province.

As expected, the majority of poisoning queries (91%) were initiated by physicians. Other callers included pharmacists (1.2%) and laypersons (2%). Unidentified callers constituted 5.8%. The average number of poisoning cases received per month was 88 (range 21 to 109). The numbers of poisoning cases were very low at the beginning of the service. Once the service was publicized and the physicians had developed trust in it, the numbers significantly increased. The peak months for the calls were from May to September. About 72% of the calls were received after hours when the DPIC was closed and were, therefore, handled by the clinical pharmacists. Most of the cases were received during the evening and night shifts (57%), with the median time being 5:22 pm and a mode of 10:00 pm. This does not reflect the time of the actual poisoning, since there was a substantial delay between the time of poisoning and hospital admission (average 4.2 hours, median 1.5 hours, SD 7.8, minimum 0 and maximum 48 hours).

The time of the actual poisoning tended to be in the afternoon, with an average time of 4:20 pm and median time of 2:40 pm. The mode occurred at 9:00 pm (SD 5.5 hours, SE 46.79), except in the month of Ramadan, when most of the poisonings occurred between 8:00 pm and 6:00 am.

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TABLE 1. *The most common type of poisoning involving children <5 years old, 6-12 years old, and adults.*

Categories	Substance ingested	Children <5 years (%)	Children 6-12 years (%)	Adults (%)
Drugs	CNS depressants	70		30
	Birth control pills	7.6		
	Iron/multivitamins	7.6		
	Paracetamol	5.7		
	NSAID	5.7	7.6	30
	Unknown	2.6	23	
	Antibiotics	2.6		
Household products	Others	27	27.4	
	Cosmetics			
	Chlorox	5.1		
	Disinfectant/deodorizers	3.2		12
	Elemental mercury	3.2		
	Naphthalene	2		
Industrial products	Others	4.4		7
		4.4		
Bites/stings		1.2	30.4	12
Food poisonings and plants		<1		
Plants			7.6	

Physicians utilizing the DPIC service tended to do so immediately. The average delay between hospitalization and DPIC call was 1.7 hours, with the median and mode being zero hours (SD 6.5 hours, SE 0.605). This demonstrates that immediate contact was made with the DPIC upon hospitalization in the majority of suspected cases.

As expected, drugs constituted the most commonly encountered group of toxins (66%). Other groups included household products (22%), industrial agents (5.2%), bites and stings (4.8%), plants (1%), and food poisoning (1%). CNS depressants were the most frequently ingested drugs, accounting for 19% of all reported cases. These included antihistamines (27%), antipsychotics (24%), benzodiazepines (18%), tricyclic antidepressants (13%), anticonvulsants (8.8%), barbiturates (4.4%), and narcotics (4.8%). Other ingested drugs included nonsteroidal anti-inflammatory agents (7.7%), unknown drugs (3%), iron products (2.6%), multivitamins (2.6%), and antibiotics (2.3%). (Percentages are based on the total number of reported poisoning cases).

Where the suspected poison was a drug, 95% of the cases were identifiable by the generic or trade name through the British National Formulary, Martindale's Extraparmacopoeia and/or the MIMS of the Middle East or Africa.

The oral route was the most common mode of toxin ingestion (91%). Dermal exposure accounted for 3.1%, inhalation 1.6%, ophthalmic exposure 1.2%, and other routes 2.7%.

Children accounted for 88% of the cases, and 92% of these were aged less than 5 years, 2.3% were between 5 and 8 years, and 5.7% were between 9 and 12 years. The most

common types of ingestion involving children as well as adults are as shown in Table 1. Where young adults (age 13-20) were involved, drugs were also the most frequently encountered toxins (68%). CNS depressants accounted for 33% and non-narcotic analgesics 16%. Household items were involved in 16% of the cases, bites/stings in 9.6%, and industrial products 6.5%. Drugs accounted for 60% of ingestions in the adult group, 30% due to CNS depressants and another 30% to non-narcotic analgesics. Other poisonings involved household products 12%, bites/stings 12%, and industrial agents 9%.

The sex of the patient was not reported in 23% of the cases. Where sex was recorded, males were involved in 60% of the cases and 40% in females.

In 36% of cases, physicians did not administer medication, and in 22%, gastric lavage was performed prior to DPIC call. From available information, 56% of these were unnecessary (ipecac could have been used) or inappropriate (due to the type of the poison or time of ingestion). Ipecac was administered in 14% of the cases before consultation with the DPIC, and 2% of these were inappropriate. In 16% of the cases where the physician had not administered any medications, gut decontamination (ipecac, gastric lavage and/or activated charcoal plus cathartic) could have been initiated prior to the DPIC call.

Symptomatic management was the therapy most often recommended, accounting for 56% of cases, if it was indicated that gut decontamination had been performed. In 36% of cases, no therapy was required. Ipecac was recommended in 13% of the cases, and charcoal plus cathartic was indicated in 47%. A specific antidote was suggested as a potentially necessary mode of therapy in 8.5% of cases (i.e., N-acetyl cystine, naloxone, deferoxamine, physostigmine, digibind, and snake and scorpion antivenom).

Morbidity and mortality were assessed based on the critical cases managed, where follow-up was possible. We lost 12 patients, accounting for a mortality rate of 0.1%. Drug level determination was recommended in 2.3% of the cases, and 49% of the reported poisonings were predicted to be nontoxic, while 20% were considered potentially toxic. Predicted outcome could not be determined from the available information in the other 21%.

## Discussion

Utilization of the Poison Center appears to be in the areas of easiest access and greatest visibility (KKUH and other Riyadh hospitals). Lower utilization from areas outside Riyadh may be due to the scarcity of long-distance services. Kingdomwide promotion of the service may improve utilization by these areas.

The initial goal of the Poison Center service to provide information to physicians on management has so far been achieved, since they are the primary users of the service. Poison centers in the US, primarily the American Association of Poison Control Centers (AAPCC), usually report an increase in the number of poisonings during the summer months and other vacation periods.<sup>1</sup> Although we did notice a slight increase in the number of calls from May

to September, a decisive seasonal trend was not noted. The trend of spending summer months outside the country could be a reason. (We have observed a slight increase during the summer months, but the difference is not statistically significant).

The delay in time between the poison ingestion and hospital admission points to the need for increased public awareness on the potential dangers, especially in cases of children. Also, the difficulty in transporting patients in the absence of the father at the time of ingestion may account for some delay. The limited availability of telephone lines in many rural areas also accounts for the delay in contacting the Poison Center, especially after hours when the administration offices are closed.

Our mortality rate of 0.1% was mostly due to the delay in contacting the Poison Center. This occurred in five cases of methanol poisoning, of which we were notified after 72 hours. The other case was a massive dose of 150 clonazepam tablets, 60 tablets of Prozac (floxetine), unknown quantities of barbiturates ingested 4 days post ingestion of other substances, another case of dextropropoxyphen ingestion 18 hours earlier, and another of snake bite in which the patient presented 24 hours after the bite. The lack of standardization of the quality of antidotes contributed to the loss of two patients with scorpion sting, who were managed with a generic product of scorpion antivenom in a rural area. Other cases were due to the absence of the requisite medical care facility in the area.

Physicians utilizing the DPIC service appear to rely heavily on our advice, since there was little delay between hospital admission and DPIC consultation. Due to the large number of potential toxin cases, physicians cannot adequately handle all cases, hence the need for a poison information center. However, knowledge of basic poison management, i.e., patient assessment and stabilization, indications and contraindications to gut decontamination, and the management of frequently encountered life-threatening agents, are needed. Perhaps a training rotation for physicians in the DPIC could help improve this. Meanwhile, extensive programs to increase public awareness of poisoning, as well as the safe-keeping of dangerous household products and medications should be encouraged and launched through the media. This will decrease the possibility of exposure, as well as enhance the proper action in case of poisoning.

Drugs of abuse are the most frequent types of drug ingestion reported by poison centers in the US (i.e., benzodiazepines, antidepressants, analgesics, narcotics, sedative-hypnotics, cocaine, amphetamines and major tranquilizers).<sup>2,3</sup> Our center showed some similarities to these findings, since CNS depressants constituted the major group of ingested drugs. Disparities between the results of these studies are most likely due to the difference in access, as well as the ages of affected victims. The majority of our cases involved accidental ingestion by unsupervised children. While children are frequent victims in the US,

drug abuse among adults also accounts for freely reported poisonings.

When training clinical pharmacists and/or physicians in the management of poisoning cases at our DPIC, it is imperative that we stress the basic management of drug ingestion (i.e., indications, doses of ipecac, gastric lavage and activated charcoal plus cathartic, as well as symptomatic therapy such as the management of seizure, arrhythmias, hypotension, hypertension, etc.).

Mismanagement of poisoning cases by the physicians, primarily in the use of gastric lavage, ipecac and activated charcoal plus cathartic, where their use is inappropriate, indicates the need for improved physician education on the appropriate therapy for poisonings. The use of activated charcoal is of great importance, however, its use by physicians is very limited; gastric lavage is the most common form of gut decontamination used by many practitioners.

The trend found in this study seems to indicate that the typical poisoning case reported to our center involves a child less than five years, most likely male, who has ingested a drug, most likely one with CNS-depressing properties over the previous hour. The physician most likely would not have had a previous experience in the management of a poison case or in performing gastric lavage on the asymptomatic child. If time allows, ipecac and activated charcoal plus cathartic, followed by symptomatic management should be recommended by the clinical pharmacist on-call. The type of poisoning in our study and substance involved was similar to that reported by AAPCC, and other Gulf studies.<sup>1,4-8</sup>

Finally, we recommend the establishment of DPICs in every region and operating them through a network. In the Riyadh area, there are more than eight DPICs operating at different levels of standards. The Poison Information Center does not merely disseminate information on poisoning but provides a high level of education (and extensive clinical background). All these centers provide eight-hour shift services, except the KKHU DPIC, which provides 24-hour service. Regionalization will not facilitate access to other centers but it will allow sharing of information and providing a database for all cases of poisoning Kingdomwide. Regionalization will also improve the quality of care provided by each center, where monitoring of facilities and standards of staff and services can be evaluated on a regular basis. As well, it will increase competition between centers for optimal patient care. Toll-free numbers to the regional centers will facilitate calls and provide care to areas deprived from such lifesaving service. The pressure on one specific center will be minimized and better outcome assessment will be more available.

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