

## PHARMACY TOXICOLOGICAL ANALYSES FOR POISONED PATIENTS AT A TEACHING HOSPITAL IN SAUDI ARABIA

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دور قسم الخدمات الصيدلانية في المستشفى في معالجة حالات التسمم التي ترد إلى قسم الإسعاف والطوارئ أصبح معروفاً وحقيقاً وذلك للدور الفعال لمركز الأدوية والمسموم التابع للقسم. إن إشراف قسم الخدمات الصيدلانية على وحدة تحاليل السموم أعطت الفرصة للصيادلة للاستفادة من إمكانياتهم العلمية والفنية. ومن أهم أهداف هذه الدراسة الحالية هو تقييم الفائدة الطبية لهذه الإضافة في معالجة حالات التسمم. خلال مدة الدراسة لفترة ستة أشهر تم حصر حالة تسمم وردت للمستشفى وتم عمل تحليل لعينات من حالة للإستفادة من إشراف قسم الخدمات الصيدلانية على هذه الوحدة. إن الدور التكميلي الواضح من مركز الأدوية والمسموم ووحدة تحاليل السموم وإشراف قسم الخدمات الصيدلانية كان له الأثر الإيجابي في تحسين الرعاية الطبية المقدمة لحالات التسمم الواردة لقسم الطوارئ والإسعاف والحد من معدل التنويم أو الوفاة.

*The pharmacist and pharmacy services roles in hospital setting were well recognized for the management of poisoned patients. Pharmacist consultation through pharmacy drug and poison information centre was very beneficial to the treating physician at accident and emergency department (AE). The inclusion of the drug toxicological analyses unit within pharmacy department services gave the chance to utilize the pharmacological background for practicing pharmacists for better handling of poisoning cases. The advantage(s) of pharmacy supervision of drug toxicological analyses unit and the role of pharmacist within such unit in teaching hospital will be determined.*

*In this study, a survey of 1160 poisoned cases arrived to (AE) department during six months period. Body fluids samples were taken for 228 poisoned cases for analysis by utilizing the pharmacy toxicological analyses unit.*

*The findings of the study represented the positive impact of pharmacy supervision of drug toxicological analyses unit beside the drug and poison information centre in the management of poisoned cases. The time and efforts of AE physicians were saved and appreciated by the integrated pharmacy services especially for poisoned patients attending AE in teaching hospital.*

### INTRODUCTION

Poisoning cases in hospitals given the right priority to be managed by the treating medical team. Poisoning is considered as threatening for patient life. All ages might be affected by the incidence of poisoning by drugs or other agents. These situations caused hazards and challenge to health care professionals that require critical assessment and treatment<sup>1</sup>.

The American Association of Poison Control Center (AAPCC) and Toxic Exposure Surveillance System declared at its 26 annual

report on 2008 that many accidental and intentional poisoning exposures cases were accounted and managed in USA<sup>2</sup>.

Acute poisoning is a common reason for presentation to hospital. The great majority of such patients does not require any specific treatment and recover completely without serious complications. Some of them have life-threatening poisoning. Poisoning still continues to be a significant cause of morbidity and mortality worldwide<sup>3</sup>. The UK in-hospital mortality of acute poisoning is between 1 and 5 deaths per 1000 presentations. Also exposure to drugs and toxins being a major cause for

patients visits to the emergency departments<sup>4</sup>. Pharmacy services department in hospital setting play very critical role in managing poisonous cases through in conjunction with its drug information center<sup>5</sup>. The role of pharmacist was expanded from consultative for providing drug information to selection of the appropriate toxicological analysis of biologic specimens from poisoned patient<sup>6</sup>. WHO in its report regarding the technical guidance for poison control recommended that the location of a poison information service and toxicological screening unit be in the same department for the benefit to patients<sup>7</sup>. Pharmacist have the knowledge of chemistry, pharmacology and toxicology this offer him the capability to be an asset in drug testing issues such as poisoned patient<sup>8</sup>. By applying this concept in one of the largest hospital which just introducing the pharmacy toxicological screening analyses for poisoning cases beside the well established drug and information centre.

The present study will highlight the clinical value for establishing a toxicological screening unit for poisoned patients within pharmacy department in hospital setting. Role of pharmacist will be determined.

### STUDY PROTOCOL

The present study was conducted at King Khalid University Hospital, King Saud University, Riyadh, Saudi Arabia. A university teaching hospital with 1200 beds. It is a general hospital with 24 hrs coverage of accident and emergency (AE) department opened for the public. All different poisoned cases were accessed to the hospital to seek medical management through this department. The approval was obtained for the local ethics committee prior to the commencement of the study.

The data were collected by studying all the poisoned cases managed by the toxicological screening unit and drug and poison information centre within the pharmacy department services in the hospital from first of January till 30 June, 2009.

The gathered information included demographic data, type of sample for analysis, type of toxin, route and time of ingestion or exposure, main cause(s), severity of the

incident, time of reaching the AE department, medical management prior to screening, and intervention progress.

### STATISTICS

All data gathered were statistically evaluated in terms of frequency and distribution using Predictive Analytics Software (PASW) VERSION 18 (IBM SPSS statistics, Somers, NY, USA).

### RESULTS AND DISCUSSION

#### Results

A total of 1160 poisoned cases were reported during the study period and the demographic data of these cases were shown in table 1. These cases were for male 572 (49.3%) and female 588 (50.7%) patients. These patients presenting different age groups, child aged 1-5 years (52.9%) was the most victims (614 cases) seen in the AE department seeking medical management for poisoning incident. Child less than 1 year of age presenting (7.9%) of poisoned cases (92 cases). Child aged 6-12 years presenting (7.2%) of poisoned cases (84 cases). Cases for adult poisoned patients were (30.8%) total of 358 cases. The less age category presented in the AE department as poisoned cases were elderly patients aged over 60 years presented (1.1%) 13 cases recorded during the study. The most reliable samples or body fluids taken from the poisoned patients during the study were serum (95.6%) and urine (4.4%).

The study data shown that the agents caused poisoning for participated patients were home stored medications (85.7%) and household products (14.3%). Acetaminophen or Paracetamol was the most agent to cause poisoning (55.6%). CNS depressants (12.9%), cough syrups (9%), anticonvulsants (8.2%), insecticides (5.3%), bleaching and detergents agents (3.5%), kerosene (2.1%), carbon monoxide (1.9%), and Butane cooking gas (1.5%).

The route of causing the poisoning mostly was oral administration by the patient (93.5%), inhaled (3.6%) and in contacting the skin (2.9%). The time of poisoning incident as shown in the study was afternoon (92.6%) the rest occurred during morning (7.4%). This

**Table 1:** Summary of demographic data of poisoned cases participated in the study.

Sex	Age	Type of poison	Route of Administration	Cause of poisoning	Severity of poisoning
Male (49.3%)	<1 year (7.9%)	Acetaminophen (55.6%)	Oral (93.5%)	Accidental (70.9%)	Need admission (19.7%)
Female (50.7%)	1-5 year (52.9%)	CNS depressants (12.9%)	Inhalation (3.6%)	Suicidal attempt (29.1%)	Discharge after Treatment within The AE department (80.3%)
	6-12 year (7.2%)	Cough syrups (9%)	Dermal contact (2.9%)		
	12-60 year (30.8%)	Anticonvulsants (8.2%)			
	>60 year (1.2%)	Insecticide (5.3%)			
		Beaching & detergents (3.5%)			
		Kerosin (2.1%)			
		Carbon monoxide (1.9%)			
		Butane Cooking gas (1.5%)			

indicated that most the cases reached the hospital during evening and night shifts with doubt about accurate time between the ingestion or exposure to the toxin and arrival time to the AE department. This specific information depended on the actual physical appearance status of the poisoned patient or his companion at time reaching the hospital. Due to this the medical charts of the poisoned cases including the arriving time with ignorance of the ingestion or exposure time of the toxin. The main causes for poisoning were accidental (70.9%) or suicidal intention (29.1%). The severity of the presented cases was evaluated by the examined AE physician and recorded as critical need hospital admission (19.7%) the rest (80.3%) treated within the AE department within 4-20 hrs after arriving the AE department and discharged. All these cases were managed with the consultation services of the pharmacy drug and poison information centre which supervised during the daily duties or on call during the evening and night shifts by professional and practicing trained and skilled pharmacists. Toxicological analyses for 288 cases (24.8%) of the encountered during the study period were performed qualitatively and quantitatively for poison levels detection by utilizing the toxicological analyses unit. Eight cases (0.6%) were lost due toxic effect(s)

or level(s) after ingestion of different poisons or materials before arrival or inside the AE department.

### Discussion

At present modern Pharmacy services department in hospital setting plays a very vital role in Patient care. Besides preparation, and dispensing of medications, it also offers the best management for poisoned patient through its drug and poison information centre and pharmacy toxicological analyses unit. The encountered poisoned cases in this study (1160) reached the AE department were managed by the AE treating physician with the assistance and support of pharmacy services department. Drug and poison information centre which initiate the management by offering the quick advice from the first call from the physician and instruct for the proper analysis method through pharmacy toxicological unit. This toxicological unit was introduced recently within hospital pharmacy services running and supervised by pharmacists obtained a postgraduate degree in pharmacological toxicology. The pharmacy department at the study participated hospital has drug and poison information centre which was established and actively functioning since early 1980s. It was the first active drug and

poison information centre offered its services for local medical staff and public inside and outside the kingdom 24 hrs and 7 days a week. Due to these advantages the centre had gained value and respect from all users as the only centre to call and worth to follow its instructions. At that time due to lack of expert full time pharmacy staff in toxicological techniques was the main reason for delaying the introduction of the pharmacological toxicology screening unit within the hospital pharmacy services department. For that reason any toxicological screening needed was obtained from other laboratories which were time consuming and sometime it offered an unreliable result affected the quality and efficacy of management process of poisoned patient. By applying the international standards for establishing toxicological analyses unit such as UK national poison information service (NPIS) and the association of clinical biochemists (ACB) beside the guidelines of American National Academy of Clinical Biochemistry<sup>2</sup>. The pharmacy department at KKUH introduced on 2008 a toxicological analyses unit which it has impact on improving the quality of service and offered complete management for poisoned patient reaching hospital. Since then the participated hospital pharmacy department drug information and poison centre was the only centre which provided 24 hrs on call drug and poison information and toxicological analyses for poison patients in the kingdom. This service gained respect from the local practitioners and from local hospitals as well as the needy public. While the other centers located in different regional hospitals offering their services locally during day shift only.

As shown in the results part 1160 cases for poisoned patients were accounted during study period. The poisons levels in 288 critical cases were determined according to drug information and poison in charged pharmacist and treating physician advices based on the clinical symptoms appeared on the poisoned patients arriving to the hospital AE department. Acetaminophen (28.6%) and Tri cyclic antidepressants (6.4%) were the most poisons detected and measured their levels by the unit. Acetaminophen was the main agent to cause poisoning (55.6% of the cases) due to the reason that this agent, most of the public they

believes it is safe medication, available in different dosage forms, cheap, can be stored in large quantities and easy to obtain as OTC item from community pharmacy and supermarket aside from treating hospital. Due to its availability children were the most age group to faced the poisoning incidents according to study (67%) of the poisoned cases. The main cause of these cases was accident. The rest age group for both male and female as shown in the results the main reasons to face poisoning were overdose (20%), intentional poisoning or suicidal attempts (13%). Eight cases (0.6%) were expired after reaching the hospital accident and AE department in coma. These cases came with unclear information regarding poisoned patient medical history, ingested poison, route of exposure, elapsed time since initial exposure. As mentioned before these information and other variables such as poison detection qualitatively and quantitatively determine which type of treatment approach might help the treating physician and drug information and poisoning center pharmacist. The pharmacy supervision of toxicological screening unit has very valuable impact on such treatment. Time saving and proper communicating process between hospital pharmacy staff supervising the drug and poison information center and toxicological screening unit resulting on a reliable therapeutic pharmacy interventions and poison toxicological analysis for managing these poisoned cases in a way to reduce morbidity or mortality. This study also approved the role of pharmacy department services represented by drug and poison information centre and drug toxicological analyses unit in the quality of services provided to poisoned cases. The role of pharmacist in supervision and running these critical parts of hospital pharmacy services was very obvious and in agreement with previous similar published works<sup>8-11</sup>. This study was conducted in a single teaching hospital and the only hospital in the kingdom which offered the drug toxicological analyses services under the supervision of skilled pharmacists within the hospital pharmacy department services. This might not necessarily reflect some patterns of managing poisoned cases in other regional hospitals within KSA. This limitation could be overcome in performing further studies on the role of pharmacy department and practicing

hospital pharmacists in managing poisoned cases in participation of most regional hospitals having pharmacy drug toxicological analyses unit or without.

### Conclusion

In conclusion the study clearly highlighted the clinical value of the hospital pharmacy supervision of drug toxicological analyses unit, a side to the pharmacy drug and poison information centre and the proper utilization of pharmacists background in supporting the AE physician in handling and offering the best medical services to the most of the poisoned cases reaching the AE department.

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