ORIGINAL ARTICLE

The Current State of Poison Control Centers in Pakistan and the Need for Capacity Building

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Abstract

Background: Chemical exposure is a major health problem globally. Poison control centers (PCCs) play a leading role both in developed and developing countries in the prevention and control of poisonous chemical exposures. In this study, we aimed to assess the current state of PCCs in Pakistan and highlight capacity building needs in these centers.
Methods: A cross-sectional survey of the two registered PCCs was done during August – December 2011. Necessary services of the PCCs were evaluated and the data were recorded on a predesigned checklist.
Results: Both PCCs are affiliated to a tertiary care hospital. Clinical services to poisoned patients were available 24 hours a day / 7 days a week. Information on common local products was available to poison center staff. Both centers were involved in undergraduate and post graduate teaching. Telephone poison information service was not available in either of centers. There was a limited capacity for qualitative and analytical toxicology. Common antidotes were available. There were limited surveillance activities to capture toxic risks existing in the community and also a deficiency was observed in chemical disaster planning.
Conclusion: PCCs in Pakistan need capacity building for specialized training in toxicology, toxicovigilance, chemical disaster planning, analytical laboratory tests and telephone service for consultation in poisoning cases.

Keywords: Capacity Building; Pakistan; Poison Control Centers; Poisoning; Public Health

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INTRODUCTION

Poisoning and toxic exposures are major health problems worldwide (1). In fact, every individual is exposed to toxic chemicals in sub-toxic doses. The expansion in pharmaceutical and chemical industry during the last century has led to an increased accidental and intentional exposure to these chemicals (2). The Chemical Abstract Service (CAS) registry, a division of the American chemical society has listed 83 million chemical substances (3). The overall toxicity data of these chemicals is limited and commonly called "data gaps". The toxicity data on high production volume chemicals is limited to only 14 to 25% of products (4). In the United States, poisoning is a second leading cause of injury-related morbidity and mortality (5). In developing countries, mortality due to poisoning is even higher than developed countries. Pesticide and hydrocarbons are leading agents in developing countries (6-8). A great proportion of the mortality in these countries is related to misuse of chemicals.

The epidemiological data on poisoning is very limited in Pakistan, as there is a scarcity of poison surveillance. The studies done in Pakistan are generally case series, based on experiences in a single medical center or intensive care unit (ICU) (9-14). In a national health survey of Pakistan, poisoning was the second commonest cause of unintentional injuries after fall in people aged five years and above (15). A hospital-based case series in Karachi, Pakistan reviewed 1900 ICU records and found 40% of them were related to poisoning (11). The overall mortality was 5.6% and organophosphates were found to be the leading cause of death (11).

The first poison control center (PCC) in Chicago, USA, has been a leading authority for poison control and prevention since its establishment in 1958. The PCC functions as part of the public health infrastructure with an initial aim to provide information to health care professionals and later expanding this to the general public. It plays a central role in the prevention of poisoning. Studies have shown that the presence of a PCC is associated with decreased hospital admission (16). In this regard, when the Grand Rapid Poison Center in Michigan, USA stopped service to few area codes in 1993, the medical claims rose to 35% in those areas compared to 0.7% when service returned

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to function (17). Another study showed that 15.5% of human exposure calls to PCC prevent one non-admitted emergency department (ED) visit (18). Taking advantage of PCCs is also associated with huge economic benefits. For every US$ 1 spent on a PCC, US$ 6.5 is saved in medical care payments (18).

A general need exists in every country for the services of PCCs. This is even more compelling in low income countries. In high income countries (HIC) such as the United States, there are other agencies that help in providing information and safety regulations for toxic risks existing in the community including Occupational Safety and Health Administration (OSHA) that monitors workplace health and issues safety regulations, Food and Drug Administration (FDA) which is responsible for protecting and promoting public health through the regulations and supervision of food, pharmaceuticals and cosmetics safety, and Agency for Toxic Substances and Disease Registry (ATSDR) which focuses on minimizing human health risks associated with exposure to hazardous substances (1,4,19). Notwithstanding, in Low and Middle Income Countries (LMIC); the PCC may be the only source of information on toxic chemicals. The additional role that a PCC can play in LMICs include community environmental hazards prevention, pesticide poisoning surveillance, product safety, occupational toxic exposure, hazardous material toxic events and monitoring of adverse drug effects (19).

PCCs in LMICs are continuously facing challenges related to updating chemical toxicity information, staff formal training, toxicological laboratory services and availability of antidotes (20).

In this paper, we aimed to evaluate existing services provided by the PCCs in Pakistan and identify the areas that need capacity building to strengthen poison control in Pakistan.

METHODS

Study Design

This study was a cross sectional survey on established PCCs in Pakistan. There are two registered PCCs in Pakistan that are located in Karachi (Sindh province) and Faisalabad (Punjab Province) and are affiliated with tertiary care teaching hospitals in the public sector of the country. These PCCs were visited by investigators during August to December 2011. The following services and resources were observed for availability and capacity building in these centers: a) provision of information and consultation services, b) facilities and equipment, c) staffing, d) clinical services, e) analytical toxicology and laboratory services, f) toxicovigilance and prevention of poisoning, g) response to major emergencies involving chemicals, h) antidotes and their availability, i) education and training

Data Collection

The coordinator/directors of the PCCs were contacted prior to visiting the centers. They were briefed about the study objectives, purpose of the visit and study procedures followed by obtaining informed consent. Information from the PCC was based on an interview of the director or coordinator complemented by direct visit to the PCC facilities. The principal investigator observed all the facilities provided at the PCCs to verify the information collected. Information was recorded in a data collection checklist developed by reviewing published literature on PCCs.

Ethical Considerations

The data were stored in the personal computer of the principal investigator and was password protected. The hard copies were kept in the office of principal investigator in a locked cabinet. The study was granted ethical approval by the ethical review committee of the Aga Khan University.

RESULTS

Both PCCs in Pakistan have close technical linkage with each other and were developed in collaboration with the World Health Organization (WHO). We found similar services being provided at both centers with minor differences. Table 1 shows the status of all services provided in the two centers. Neither of the centers provided telephone information or consultation for poisoning cases to the general public or healthcare practitioners. They had information on local toxic chemicals, consumer products and drugs which were commonly involved in poisoning cases. But this information was only available for use by the PCC staff and associated clinical services.

Table 1. Status of the services available in poison control centers of Pakistan

Services	Center 1	Center 2
Provision of information and consultation services		
External scientific sources / database available to poison center staff to answer poisoning queries	WHO database	WHO database
Information on local commercial product	Limited to common products	Limited to common products
Call service for drug and poison information	Not available	Not available
Capacity to identify tablets, capsules, plants and fungi.	Limited to common tablets and capsules	Limited to common tablets and capsules
Database updated regularly	Not updated	Not updated
Documentation of poisoning cases	The data are recorded in standardized forms	The data are recorded in standardized forms

Table 1. Continued.

Services	Center 1	Center 2
Standardized recording of public inquiries	Not available	Not available
Information on health and relevant resources	Not provided	Not provided
Computerized information package	Available but not used	Available but not used
Facilities and equipment		
Adequate space and furniture	Yes	Yes
Access to literature and other sources of information	Access to reference library, online journals and internet resources	Access to reference library, online journals and internet resources
Area for personal hygiene, food and rest	Yes	Yes
Necessary equipment for functioning	Computer Internet Teaching aids Overhead projectors	Computer Internet Teaching aids
Staff		
Medical toxicology director	Internal medicine specialist performs this role	Forensic medicine specialist performs this role
Sufficient personnel for 24/7 operations	7 physicians 5 nurses	4 experienced Physician 4 Nurses
Poison information specialist	Not available	Not available
Veterinary expertise	Not available	Not available
Administrative and support staff	4-5	3
Specialist advisors	Access to clinical specialists	Limited access to clinical specialists
Clinical services		
Emergency services	Available	Available
ICU	Available	Available
General medical units	Available	Available
Specialized services	Available	Available
Clinical toxicology unit	40 beds	6 beds
Analytical toxicology and laboratory services		
Qualitative and quantitative assays	Laboratory equipment for qualitative assays and relevant tests are available in the center*	Qualitative assays are done in collaboration with government central laboratory
Treatment efficacy monitoring	Available	Not available
Chemical exposure and biological monitoring	Not available	Not available
Collection/storage of specimens and interpretation of results	Not available	Not available
Toxicokinetic research	Not available	Not available
Toxicovigilance and prevention of poisoning		
Poisoning risks in local community	Limited to poison center records	Limited to poison center records
Monitoring of incidence of poisoning	Not monitored	Not monitored
Commercial product toxicity	Not monitored	Not monitored
Health authority reporting	Yes	Yes
Other Services		
Response to emergencies involving chemicals	Not available	Not available
Antidote availability	Antidotes for common poisons	Antidotes for common poisons
Education and training	Training of clinical residents in toxicology	Educational interventions in schools
Inpatient poisoning caseload	5-6 cases/day ~ 2000 cases/year	2-3 cases/day ~ 1000 cases/year

* Qualitative tests include assessment of: alkaloids, metals, insecticides, corrosive agents, hydrocarbons, chlorpromazine, amphetamines, barbiturates and benzodiazepines

Owing to no telephone services, there were no formal records of poisoning case inquiries; however both centers had developed standardized forms for collection and storage of information on all poisoned cases presented at these centers. On average, 2 to 6 poisoned cases presented at these centers each day. Moreover, thousands of cases were registered but this information was not analyzed for research purposes.

It was also found that adequate human and capital resources for the current services were being provided at the centers. There was a good functional office space including teaching rooms assigned specifically for training PCC personnel and clinical residents. Training was conducted on a regular basis by experienced professionals.

A major component of the services was providing clinical care to poisoned patients. The PCC inpatient services were provided round the clock, seven days a week. Both centers had allocated beds for poisoned patients who were monitored and treated by hospital personnel associated with the PCC. Antidotes for commonly used poisons including anti snake venom were available at both centers. This was coupled with laboratory equipment for qualitative assays of poisons at one of the centers. The same center also had the capacity to monitor efficacy of treatment being provided.

However, academic activities were limited to training of personnel at both centers. There was an access to online literature and designated library sections in these centers but no formal research was being conducted. Poisoning risks and trends were assessed informally, based on clinical observations and reported to health authorities. Both centers did not have the capacity for toxicovigilance or community-based assessments. Hence, chemical disaster planning was appeared to be deficient. School-based education interventions were carried out by one of the centers.

DISCUSSION

This study highlighted positive facets of regulating streamlined PCCs in Pakistan and their potential capacity to provide additional useful services that will not only fulfill an existing urgent need in this specialized field but also help in reducing the incidence of frequent and unattended poisoning cases in the future.

One of the most important strengths in both PCCs is standardized recording of cases presenting to the affiliated hospitals. These databases play a vital role in identifying toxic chemicals available in the community, changing trends in poisoning, occupational hazards, pattern of addiction and drug prescription errors (19). These data would also be useful in planning preventive strategies and advocating policies through regulatory authorities. Dissemination of these data would also alert other health care professionals to take active measures in prevention and treatment of poisoning. Moreover, it will facilitate further research and findings in this area. Currently, the information and consultation services are limited to patients presenting to affiliated hospital, while a call service for the community does not exist in both PCCs in Pakistan. Strengthening this area will maximize the poison control strategies in the country by reducing visits to ED through telephone consultation and also help better management of poisoned patients in hospitals when there is no toxicology expert available. The standardized coding of telephone queries will enhance the toxicovigilance role of the centers (5,19).

Another important strength is the availability of the WHO database of chemicals in these centers along with a reference library and internet access to scientific journals that led to updated management and advice for patient management and training of health care staff. Currently, the database for local chemicals available in the country is not updated and the information on their ingredients is limited. This is an area which requires utmost attention by regulatory health authorities. Most of the recorded cases in both centers were related to pesticide poisoning (11) and many local commercial pesticide containers do not have proper labeling to identify the dose and concentration of active and inactive ingredients. In Vietnam and Morocco, pesticides have also been reported to be the main cause of poisonings (8,21). It has been ascertained that easy availability of hazardous pesticides and no regulations have led to an increased mortality rate in pesticide poisoning (11).

Both centers in this study have an analytical laboratory available that can analyze the common drugs of abuse and some other common chemicals qualitatively. A quantitative assay is not available in both centers. Besides, some other essential tests like RBC cholinesterase which is a very specific test for organophosphate poisoning as well as assessment of serum concentrations of certain drugs in which treatment is based on drug levels, should ideally be available in these centers. Collaborative linkage to the Pakistan Council of Scientific and Industrial Research (PCSIR) laboratories which have the capacity to conduct these toxicological testing will serve the purpose without additional resources.

Both centers were actively involved in post graduate and under graduate trainings with essential teaching aids available. Some community and school-based awareness programs are also being conducted. New Zealand National Poisons Center has similarly conducted several programs and research on school and preschool toxic exposures (22,23). They revealed that identification of risk areas in school environments allows recommendations to be made to teachers about possible exposures, storage and access to science, cleaning and art supplies (23).

Furthermore, in Pakistan; a need for structured training programs still exists in both clinical and environmental toxicology to strengthen the PCCs as well as for the quality care of patients. Studies have shown that structured courses and training improve knowledge of the healthcare providers and efficiency of care delivered to poisoned patients (24).

In this study, it was shown that both centers have tertiary care clinical services available with busy emergency departments and ICU facilities. This is similar to most of the poison treatment centers in Iran which are affiliated with tertiary care centers with specialized clinical services provided to poisoned patient, both in ED and as inpatient. But the centers in Iran have well established drug and poison information service which are lacking in Pakistan (25,26). It should be noted that load of poisoning cases in our centers does not reflect the actual burden of poisoning in Pakistan since other government and private tertiary care hospitals also provide care to these patients (11-14).

Some of the services that were found to be deficient in the PCCs of Pakistan are inability to identify toxic risk existing in

the community, monitoring of the toxicity of commercial products and occupational and environmental hazards. The PCCs also need support to act as a resource center for major chemical disasters. These are some of the challenges faced by PCCs in developing countries. Since other regulatory agencies are lacking in developing countries compared to developed countries, PCC in developing countries can take a leading role as an advisory service for toxic risk existing in the community, terrorist attacks, chemical product regulation, pattern of drug addiction and unexpected product uses (27).

LIMITATIONS

Some of the services such as presence of online resources available in the centers were not directly observed by research team and its information was solely dependent on the responses of the interviewees and could subject to socially desirable response. However, most of the services were confirmed by direct observations. Moreover, in some cases in-depth detail of services could not be retrieved such as quality of teaching activities.

CONCLUSION

In Pakistan, there is an urgent need to improve the access of general public and healthcare professionals to the PCCs through a systematic provision of telephone consultation service to standardize poisoning related healthcare costs as well as providing effective care for poisoned patients. Since use of chemical products is increasing in Pakistan with limited inhibitory regulations, PCCs can also take a leading role as an advisory service for regulations of environmental, chemical and occupational toxic exposures. It is necessary that the available poisoning databases in these centers be utilized by epidemiological studies at institutional and community level for the improvement of toxicovigilance. We also recommend the provision of specialized training in both clinical and environmental toxicology in these centers to provide quality care to poisoned patients as well as to reduce toxic risk existing in the community through education and targeted intervention.

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