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RESEARCH ARTICLE

Cross-sectional study evaluating the patterns of queries received by a newly established drug and poison information center in a tertiary care hospital

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ABSTRACT

Background: The newly established drug and poison information center (DPIC) at the Department of Pharmacology, Akash Institute of Medical Sciences and Research Centre, located at Devanahalli, Bangalore Rural, Karnataka, India, provides drug and poison information services to healthcare professionals (HCP) and to the patients. The DPIC is effectively functioning since 2016. **Aims and Objectives:** To assess and evaluate the services delivered by DPIC. **Materials and Methods:** A cross-sectional observational study was conducted over 1-year period (December 2016-November 2017) to assess the patterns of queries received by DPIC. A total of 147 drug and poison-related information queries were received and answered during the study period. Data analysis was done by GraphPad. **Results:** Of the total queries received, majority of queries were from HCP (49%) followed by doctors (42%) and patients (9%). Majority of the queries (82.2%) were received by telephone access/WhatsApp messages (60%). A total of 60.54% queries were related to know the identity, symptoms, antidote, and management of poisoning cases. Most of the queries were for better patient care (88%) and the information was provided verbally for majority of the queries (81%). For most of the poisoning queries (62.9%), the information was provided immediately significantly ($P < 0.05$). **Conclusions:** DPICs can offer drug consultation services for HCP and patients in identifying poisons, symptoms, antidotes and management of poisoning cases and well detect and prevent adverse drug reactions and drug-drug interactions, etc. Therefore, improve overall patients' healthcare standards can promote rational therapeutics.

KEY WORDS: Poisoning; Drug and Poison Information Center; Antidote; Treatment of Toxic Symptoms; Adverse Drug Reactions

INTRODUCTION

The numbers of medications approved by drug regulators are continuously growing, resulting in an extra burden for the healthcare providers in updating information on their safety, efficacy, scientific evidences, availability, cost, dosages, indications, generic substitutions and other medication-related issues, etc. For these reasons and others, drug and poison information centers (DPICs) were established with the primary goal of providing valid information on demand to those who are in urgent need of such information.[1] The provision of accurate, prompt, timely and evidence-based drug and poison information to healthcare professionals (HCPs) is an important mechanism to promote safe and effective drug therapy for patients.[2,3] DPIC provides easy access, valid,

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unbiased scientific evidence-based drug information to the physicians, HCPs, patients, and general population. Apart from this, these services can help to identify unknown poisoning substances and prevent adverse drug reactions (ADRs), drug-drug interactions, medication errors, and promote rational use of drugs. Therefore, these centers can positively improve overall outcome of the therapy and patient care.[4]

The lack of unbiased drug information is one of the factors that make the HCP unable to update their knowledge about drugs which results in an increasing demand for drug information to promote patient care. Therefore, DPICs services are necessary to provide support for healthcare providers.[5] The World Health Organization (WHO) recognizes independent drug information centers (DICs) as a core component of national programs to promote the rational use of drugs.[6]

Indian Scenario

In India, there is a significant drug usage problem. Irrational and unnecessary prescribing is common, especially with antibiotics, analgesics, and intravenous fluids. Antibiotic resistances are widely spreading, especially in multidrug-resistant tuberculosis and HIV patients. These problems are as a result of variety of economic, social, political, occupational, medical, and regulatory factors. The developing countries like India drug information due to limited availability of current literature and also poor documentation, poor funding for the research, and multiple systems of medical practices such as allopathy, Ayurveda, Unani, Siddha, and Homeopathy. More than 80,000 plus drug formulations are marketed in India and more than 20,000 biomedical journals available and more than 6000 journal published every day. It is a herculean task for HCP to keep them up-to-date with available drug information. As a result, the quality suffers. There is potential of clinical pharmacologists, medical pharmacologists, and pharmacists to fill this gap in hospitals.[7,8] In India, the provision of drug/poison information is a quiet emerging concept, since 1992, there are only 18–25 DPICs providing information services in India. Among these, few information centers are independent, not attached to hospitals. They provide drug information to many hospitals in their area. When compare to number of hospitals and the population to be served in India, the numbers of information centers are far below what is needed.[7]

India is an agro-based country, and hence, people have an increased access to pesticides and rodenticides. This predisposes the population to choose organophosphorus and rodenticide compounds for poisoning.[9] The aim of this study was to evaluate of drug and poison information services provided at our tertiary care center.

MATERIALS AND METHODS

Study Type and Settings

A cross-sectional observational study was conducted over a period 1 year (December 2016–November 2017) at newly established DPIC at Akash Hospital, located at Devanahalli, Bangalore Rural. Data were obtained from the DPIC archive. The DPIC at Akash Hospital has basic and necessary infrastructure facility such as computer, printer, internet facility, and information resources such as standard text books, the WHO formulary, National Formulary of India and access to the e-journals, and evidence-based national/international guidelines to provide the necessary timely information. Study was initiated after ethics committee approval. The trained clinical pharmacologists received drug/poison information query from the clinicians, HCP, and patients. A systematic stepwise approach was followed to resolve queries.

All the relevant and necessary details pertaining to drug/poisoning query including type of population (children, adult, elderly, and pregnant), poisoning agents, route of exposure, type of poisoning (intentional, accidental, and environmental), poisoned patient's demographic details (age, gender, and bodyweight), enquirer details (enquirer background, place of call, and mode of request), details of query (category of query and purpose of query), and details of poison information (information provided, mode of provision, time taken to provide information, and reference consulted) were collected and documented in the poison information register. In case of poisoning cases, exposure classes, reasons of exposure, route of exposure, quantity, history of vomiting, and primary care (if any) received were recorded.

Statistical Analysis

For easy storage and retrieval of information, the details were also documented in the soft copy/electronic datasheet. The data were analyzed performing frequency/percentage value and Chi-square test.

RESULTS

From the past 1 year, DPIC has provided information, advice, and serving as a guide for improving patient care and management; training students and nurses in the field of poisoning, ADRs, and drug information; conducting research in the field of pharmacoepidemiology, drug safety, and poisoning. The various calls received from the emergency department (ED) and intensive care units (ICU) are attended.

A total number of 147 queries were received. During the study period, 53 (59.58%) females and 36 (40.42%) males were treated for poisoning. The female-to-male ratio was 1.48:1.

It was found that 35 (39.32%) of the patients belonged to the age group up to 16–25 years followed by 36 (40.44%) in the age group of 25–40 years. The mean ± standard deviation age group of the poisoned cases was 26.92 ± 14.2 years.

The categorization of drug/poison information queries based on background information is shown in Table 1. The queries were made by treating physicians accounted for 42%, HCPs (49%), and the patients (14%). The mode of access was direct in 28% and 12% during the ward/ICU/ED department rounds and by telephone/WhatsApp messages were 60%. The categories of queries mainly included contents of the poison (18%), identification of tablets (22%), antidotes (27%), and specific management measures (20%). The purpose of query includes for the patient care and management (88%) and for the update of knowledge 12%. The required information on queries are either communicated directly with the HCP (81%) and sometimes were give the print out copy of the required information (19%). Most of the queries were answered on the same day itself extending from immediately (20%), within few hours to 2–4 days (16%). Very few were answered within the next day.

The classification of poison information queries as per the type of poisoning is shown in Table 2. The suicidal attempts made by patients accounted for generation of more queries (52%). The types of poisoning agents queries received are shown in Table 3. Among the 89 patients who consumed poisons, in 8 of them the poison was unidentified. The remaining 81 patient's poisoning contents were identified. The drugs responsible for poisoning (n = 23) are shown in Table 3. Altogether 23 patients have taken drugs as the

Table 1: Categorization of drug/poison information queries based on background information

Background information	Subcategories	Queries *n* (%)
Enquirer's status	Doctors	61 (42)
	HCPs	72 (49)
	Patients	14 (9)
Mode of receiving queries	Direct access	41 (28)
	Ward rounds	17 (12)
	Telephone/WhatsApp messages	89 (60)
Category of queries	To know the contents of the poison	27 (18)
	Identification of tablets	32 (22)
	Toxic ingestions of tablets	19 (13)
	Antidotes	39 (27)
Purpose of the query	Specific management measures	30 (20)
	Patient care drug dosage, efficacy, alternative treatment, ADRs, availability, cost and drug interactions, poisoning information, etc.	130 (88)
	Update knowledge	15 (11)
	Others	2 (1)
References consulted	Textbooks/reference books	18 (12)
	Standard treatment guidelines	21 (14)
	Poisindex	34 (22)
	Others (websites, published articles)	74 (50)
Mode of provision	Verbal communications with clinicians	119 (81)
	Printed	28 (19)
Time taken to provide information	Immediately	29 (20)
	Within 1 h	61 (41)
	Within 1 day	33 (22)
	Within 2–4 days	24 (16)
Type of query	ADRs	19 (13)
	Drug therapy	45 (30)
	Dosage/administration	23 (16)
	Cost/availability	21 (14)
	Drug storage condition information	9 (6)
	Others	30 (21)

HCPs: Healthcare professionals, ADRs: Adverse drug reactions

Table 2: Classification of poison information queries as per the type of poisoning

Type of poisoning	Queries *n* (%)
Intentional	17 (19)
Suicidal/self-destructive	47 (52)
Accidental	11 (12)
Abuse/misuse	7 (8)
Environmental	3 (3)
General/others	4 (4)
Total	89

Table 3: Types of poisoning agents queries received

Type of poisoning Total (*n*=89)	Queries *n* (%)
Pesticides (*n*=39)	
Organophosphate compounds	13
Carbamate	3
Pyrethroid	9
Rat poison (aluminum phosphide, yellow phosphorus)	10
Organochlorine (e.g. deltamethrin)	2
Paraquat	2
Medicines (*n*=23)	
Paracetamol	3
Thyroxine	1
Benzodiazepines	2
Phenytoin	2
Phenobarbitone	1
Carbamazepine	3
NSAID-ibuprofen, tramadol	4
FDC	5
Other drugs	2
Household products (*n*=5)	
Kerosene	2
Cleansing agents (lysol)	2
Paint thinner	1
Environmental (*n*=14)	
Snake/rattles bites	13
Stings/insects	1
Unknown/unidentified (*n*=8)	8

NSAID: Non-steroidal anti-inflammatory drug, FDC: Fixed dose combination

poison. The various drugs responsible for the poisoning include paracetamol, thyroxine, phenytoin, phenobarbitone, and tryptomer were analyzed. The demographic distribution of type (accidental/intentional) of poisoning is shown in Table 4. The more incidences of poisoning cases were prevalent between the age groups between 25 and 40 years in both genders.

Drug information questions enquired about therapeutic uses, adverse effects, drug interactions, doses, and a few on the teratogenic potential of medications. It was found that toxicants encountered (n = 39) comprise the majority of followed by medications (n = 23) and household products (n = 5). Most of the patients were asymptomatic (44.1%). Gastrointestinal complaints (vomiting, nausea, abdominal pain, diarrhea, and burning in the throat) were the second most common complaint by the patients, followed by cholinergic system effects. Most of the patients were referred from secondary care centers such as taluka hospitals or nearby nursing homes. Few patient who consumed tablets, there may be no symptoms, or only minor symptoms, even when severe damage is occurring in some overdoses (for example: Paracetamol).

DISCUSSIONS

A new DPIC was established at Akash Hospital. DPICs have a responsibility to provide classified authentic information on demand by clinicians about drugs/poisons. They also provide the information on queries arising during ward rounds and enquiry by patients.

A total of 147 queries were received from the doctors, HCPs, and including patients. It was found that 35 (39.32%) of the patients belonged to the age group up to 16–25 years followed by 36 (40.44%) in the age group of 25–40 years. During the study period, 53 (59.58%) females and 36 (40.42%) males were treated for poisoning. The gender ratio was 1.48:1.

A study from the US found the mean age as 16.9 years for the patients attempting suicides. In our study, age group 21–40 years was the highest in number. A similar findings were seen by studies conducted in India by Khadka *et al.* and Gargi *et al*. In general, this middle-aged group is more prone to stress and might have an increased risk for suicidal poisoning.[10-12]

The categorization of drug/poison information queries is consistent with Lakshmi *et al*. In our study, 71% of the poisoning cases were intentional. Our result is comparable with the study by Paudyal.[13] Where 75% of the poisoning was intentional. One more study from South India reported intentional poisoning in 96% of the cases.[14] The causes for intentional poisoning are generally related to psychosocial and emotional factors. In our region, there was an ongoing famine due to lack of rain might have also had an influence. However, we failed to analyze the cause behind the intentional poisoning as our study was one of the limitations.

We found agrochemical pesticides as the common poison responsible in 43.8% of the total poisoning substances. The results are consistent with study from South India

Table 4: Poisoning incidents based on age, gender distribution, and type (accidental/intentional) of poisoning

Age	Intentional		Accidental	
	Male	Female	Male	Female
0–15			2	1
16–25	18	15	2	3
25–40	13	19		2
41–60	5	4	1	
61–80	2	-		1
90+			1	
Total	38	37	6	7

reported agrochemical pesticides as the common agents. Organophosphorus compounds are also a major cause of poisoning in developing world consistent with Singh and Unnikrishnan.[15]

The accidental poisoning in 12% of the cases was either by pediatric patients, poisoning due to tablets or kerosene consumption. In general, pediatric patients are at a higher risk of accidental poisoning. One study from Nigeria reported accidental poisoning accountable for 98.4% of the total pediatric poisoning cases. The accidental poisoning in children warrants that the mothers or the guardians instead of caretakers should be counseled while prescribing medications to the children and drugs to be kept out of reach of children. This is similar to the study by Adejuyigbe *et al*.[16]

The route of poison intake plays an important role in the prognosis. In case of the contact poisoning, the treatment becomes easy, whereas in case of parenteral poisoning it becomes difficult. In case of oral ingestion, the prognosis and the treatment pattern depends on the time duration between the intake and gastric lavage, decontamination measures, concurrent drug/alcohol administration, quantity, history of vomiting, oral absorption of the drug, etc. In case of corrosives, however, vomiting should not be induced. In our study, 96.64% of the cases took the poison orally. A study by Khadka and Khadka from Nepal. [11] Furthermore, identified oral route as the common route responsible for poisoning in 86.57% of the cases. DPIC helps in patient management by providing authentic unbiased information and also aid in development of therapeutic guidelines/protocols.

In our study, rat poison accounted for the second most common agent for the poisoning accounting for 11.23%. Our finding is supported by Gargi *et al*. that aluminum phosphide (a constituent in rat poison) as the common poison accounting for 38.23%. Our findings suggest that there is a free availability of rat poison in the region. Rat poison can be of mainly three types, anticoagulant containing, phosphide containing, and red squill containing. Since rat poisoning is common in our region, there is a need for developing standard guidelines for managing this poison.[12] We found ingestion of drugs at the toxic doses are responsible for 25.84% of the poisoning cases, consistent with Singh and Unnikrishnan identified 17% of cases to be due to drugs.[15]

Limitations

In some cases, in-depth detail of the information about the queries of drugs and poisons could not retrieve due to restricted access to source of information.

CONCLUSIONS

DPIC can play a key role in the prevention and management of drug-related problems and poisoning cases through provision of information to physicians, HCP, and patients. Therefore, improve overall patients' healthcare standards and promote rational therapeutics.

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