

Epidemiologic Analysis of Drug and Poison Information Center (DPIC) Inquiries: A Four-Year Cross-Sectional Study in Hamadan, Iran (2019-2023)

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Abstract

Background: Drug and Poison Information Centers (DPIC) play a pivotal role in pharmacovigilance, public education, and preventing adverse drug reactions, medication errors, and poisoning incidents.

Methods: This study presents an epidemiologic analysis of inquiries received by the DPIC at Hamadan University of Medical Sciences in Iran over four years (2019-2023). A descriptive cross-sectional analysis of recorded phone calls to the DPIC at Hamadan University of Medical Sciences from October 2019 to November 2023. The demographic distribution of inquirers, types of inquiries, and sources used to answer questions were considered in the analysis.

Results: The study reports a total of 3904 recorded calls over the four-year period, with an average of 78.08 calls per month. The majority of callers were female (61%). The top three questions focused on coronavirus, side effects, and drug-drug reactions. Psychiatric agents, gastrointestinal agents, and antibiotics were the top three drug families inquired about. The data were collected from various references, with UptoDate® being the most frequently used (43.3%).

Conclusion: This study provides a comprehensive epidemiologic analysis of inquiries received by the DPIC at Hamadan University of Medical Sciences. The findings underscore the importance of DPICs in providing evidence-based information, contributing to pharmacovigilance, and enhancing patient safety.

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Keywords: Medication Error; Pharmacovigilance; Epidemiology

Introduction

The complexity of modern medicine, coupled with the vast array of available medications, necessitates a robust system to ensure the safe and effective use of drugs. From the first establishment of Drug and poison information center (DPIC) which need of accessible, evidence-based drug information to support rational drug use complied, in the University of Kentucky in the United States in 1962, the use of this premise has come into light in terms of controlling and reporting adverse drug reactions (ADR) which immensely contributed to pharmacovigilance and public education (1-4).

Preventing drug misuses, lowering expenses, decreasing unnecessary admissions, improving medication adherence, and enhancing patient safety has been suggested by some studies as the effectiveness of DPICs (2).

In Iran, the recognition of DPICs' significance led to the establishment of the first center in 1997, in Tehran and the Namazi hospital DPIC in 1995. Since then, the number of DPICs has expanded, providing invaluable services to healthcare providers and the public (2).

Moreover, role of DPICs in reporting and recording ADRs should not be overlooked, as they play a crucial role in collecting and analyzing data on ADRs, providing valuable insights into the frequency, severity, and types of ADRs that occur within healthcare settings and the community and also to pharmacovigilance which is the study of detection, assessment, understanding and prevention of ADRs (5). These data contribute to a comprehensive understanding of drug safety and can be utilized to identify potential safety concerns, inform regulatory decisions, and optimize drug prescribing practices (6).

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In an era defined by constant advancements in medical sciences and therapeutic interventions, the role of DPICs remains indispensable. Furthermore, DPICs serve as the frontline in preventing poisoning incidents by providing educational resources, counseling callers on poison risk assessment, and advising on appropriate treatment measures (7). These services can help alleviate the burden of poisoning on healthcare systems and minimize associated morbidity and mortality. The aim of this study is to provide an epidemiologic analysis of the recorded inquiries received by the Hamadan DPIC from 2019 to 2023.

Methods

This was a descriptive cross-sectional study reviewing recorded phone calls to DPIC located in the Hamadan University of Medical Sciences (UMSHA) in Iran from October 1st 2019 until November 30th 2023. This center provides a telephone service that operates from 8 am to 14 pm, providing information and consult for patients and healthcare professionals. The operator is a trained pharmacist having access to evidence-based references. All enquires are documented in a structured data collection form.

Five different types of printed forms- Lactation, pregnancy, medication error, toxicity and drug related problem - were designed by a clinical pharmacist, and the call-recipient trained pharmacist was asked to fill them for each patient regarding the question they made.

At the end of every three months, written forms were gathered, evaluated, recorded and reported to Iranian FDA. At the end of the study, the demographic data, detailed enquiries of the caller, and toxicities if recorded, were analyzed by using the Microsoft Excel 2010 (Microsoft Corp., Redmond, WA, USA). The identity of the callers was kept confidential.

Results

During the period of 4 years and 2 months, the total number of recorded calls was 3904 with mean of 78.08 calls every month. Demographic distribution of inquirers, as is demonstrated in Table 1, states that majority of callers were female (61%). Most patients were in 40-60 age-group. (23.6%). Most of the calls took place between 10 am -12 (49%). The most common reference used to answer questions was UptoDate® (Table 2) Fig 1 shows the percentage of question categories and Fig 2 shows the drug family which was asked about during the calls. Based on Fig 1 top 3 questions that callers asked were about corona virus, side effects and drug-drug interaction, with 15%, 12.7%, and 9.6%, respectively. Top 3 drug families

that were the subject of questions were psychiatric agents (10.3%), gastrointestinal agents (8.4%) and antibiotics (8.1%).

Table 1. Demographic distribution of inquirers

Gender	Male/female	N (%)	
		1536 (39%)	2388 (61%)
Age (year)	0-2	284	(7.3%)
	2-12	459	(11.8%)
	12-18	285	(7.3%)
	18-30	615	(15.8%)
	30-40	908	(23.3%)
	40-60	921	(23.6%)
	60<	452	(11.6%)
Caller’s identity	Public	3886	(99%)
	Pharmacist	10	
	General Practitioners	6	1%
	Specialists	1	
Year	Healthcare professional (other than already mentioned)	25	
	2019	382	(9.7%)
	2020	1196	(30.3%)
	2021	697	(17.8%)
	2022	762	(19.5%)
	2023	867	(22.2%)

Table 2. References used to answer the questions

Sources	Percentage
Micromedex®	2.2
Uptodate®	43.3
Poisindex®	0.1
Martindale®	0.2
APHA	3.5
Drug Facts and Comparisons	2.8
The 5 minutes Toxicology Consult	0.5
Applied Therapeutics	1.4
Brigg’s drugs in pregnancy and lactation	4.3
Drug Brochure	2.2
AHFS Drug information	1.2
Handbook on Injectable drugs	0.4
Iranian Herbal PDR	0.1
Journal and AI models	21.7
Corona pandemic national guideline	22.6

Figure 3 states that the most frequent toxicities happened by chemical agents (64.6%), followed by medicinal poisoning

(18.3%). Results also showed that 7.1% of poisoning happened deliberately and 92.9% were accidental.

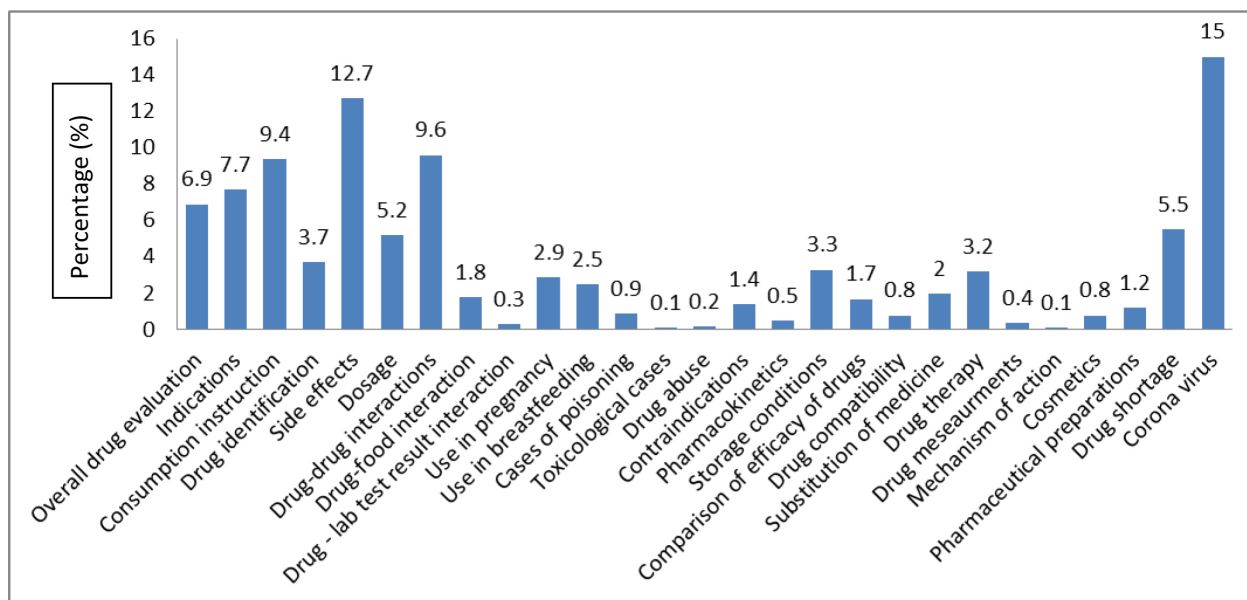


Figure 1. The percentage of question categories

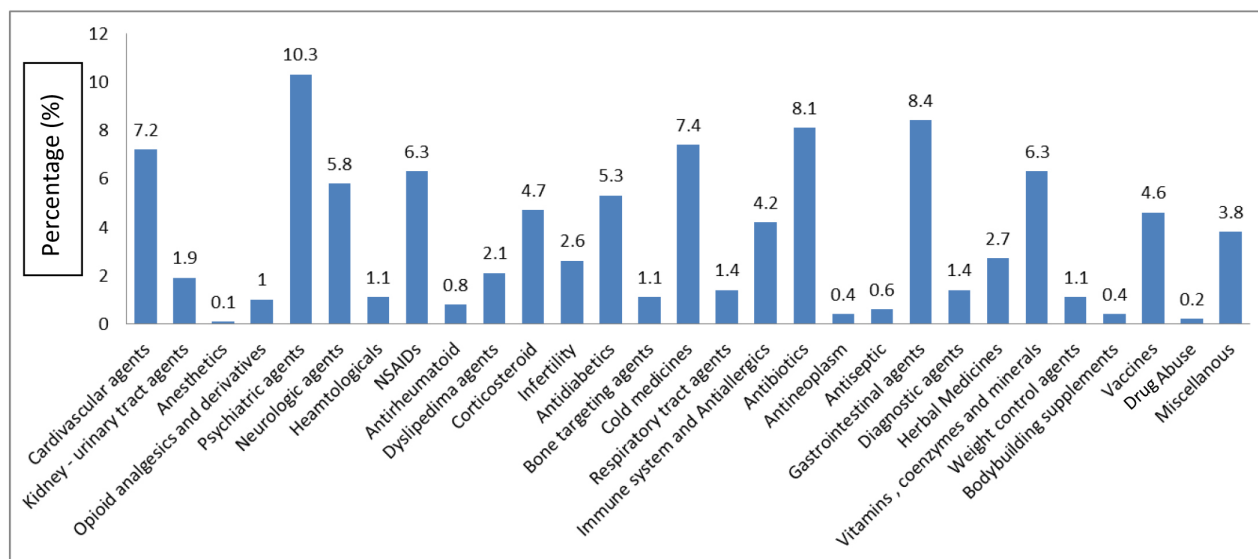


Figure 2. The percentage of drug family distributions

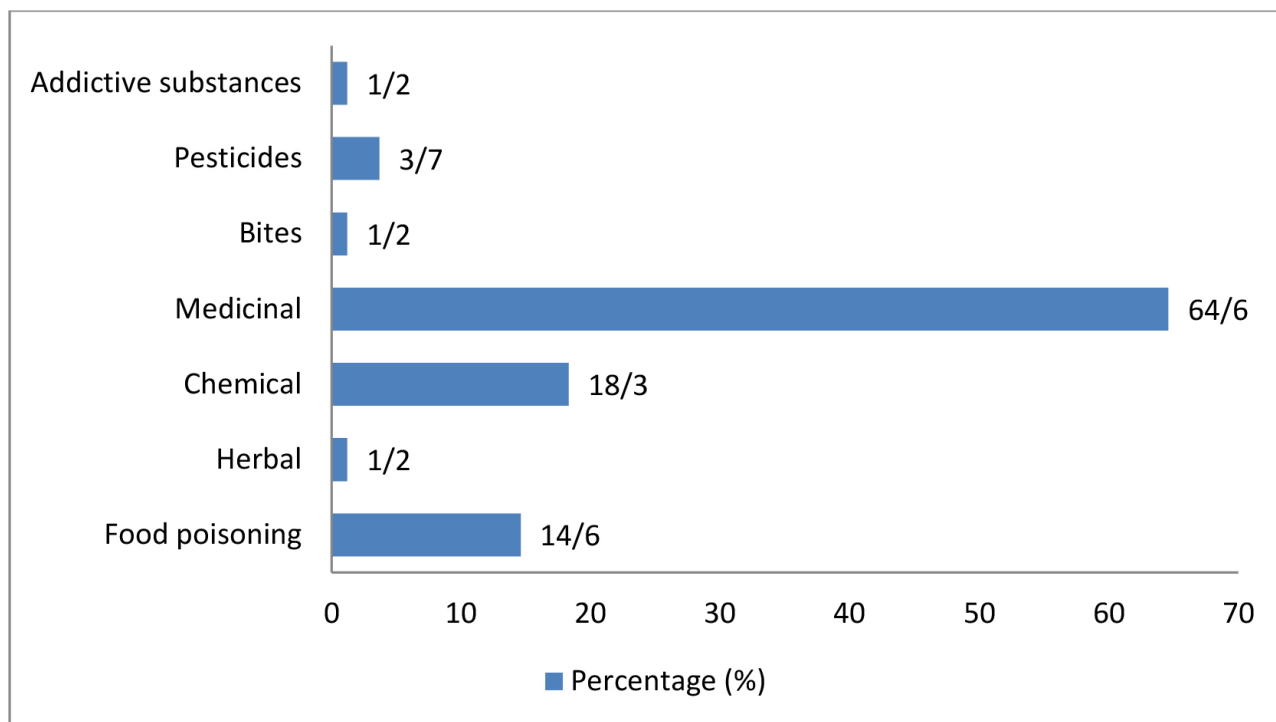


Figure 3. Different Kind of poisoning recorded

Discussion

DPICs are indispensable components of healthcare systems, serving as invaluable resources for preventing ADRs, medication errors, and poisoning incidents. Their contributions to pharmacovigilance and public education are crucial for ensuring the safe and effective use of medications, thereby promoting patient safety and overall well-being.

During our study we found out that majority of inquirers were female (61%), which in line with findings of other studies in Iran, Finland, and the Netherlands (2, 8-11). This maybe justifiable as women are mostly responsible for healthcare in a household. Also they care to check the medication and be more cautious. Most of the callers were in the age group of 40-60 (23.6%) and this might be because of more poly-pharmacy cases in this group. Queries by individuals older than 60 year of age were notably less (11.6%), despite the fact that is expected to be more as poly-pharmacy rise with age as is stated by some studies (12, 13). which may be due to not enough attention of the care taker and less familiarity to telephone services.

Health care professional enquiries' consisted 1% of all questions and this low rate may be the result of inadequate publicity and incomplete knowledge of this center.

Due to outbreak of covid-19 pandemic in 2019, most of

the question (15%) during the period of 4 years of this study has been evolving around this subject.

Most questions were about psychiatric agents which sub categorizes as sedative-hypnotics (2.5%), antipsychotics (1.6%) and antidepressant (6.2%). The considerable use of antidepressants is in line with the result of a study conducted retrospectively, comparing the utilization of antidepressant in Iran and the results showed increasing rate of usage and that 60% of prescriptions in Iran included a member of this family (14). And also Hamadan is a referral center of psychiatric disorders in west Iran.

The primary reference for addressing inquiries in our center is UptoDate®, a trend consistent with the findings of Entezari-Maleki et al.'s study conducted at the 13-Aban DPIC in Tehran (15). Micromedex® is widely utilized in various drug information centers in Iran and the United States (2, 4, 7, 16, 17). Shadnia et al., highlighted Micromedex® Healthcare Series as the predominant information resource in the Loghman-Hakim hospital DPIC in Tehran (7), suggesting its comprehensive and specialized role, particularly in the context of drug poisoning compared to UptoDate®.

A Canadian study aimed at discerning user preferences among popular online drug information databases revealed that Lexi-Comp® held higher preference compared to Micromedex® (18). Notably, Lexi-Comp® provides drug information available in UptoDate®. In a study assessing the performance of a DPIC in southwestern

Iran, UptoDate® emerged as the predominant source for answering inquiries (3).

While Ghane *et al.*, initially claimed UptoDate® to be the most commonly used reference in their first study (8), their second report indicated a shift, with Micromedex® being the preferred reference for answering inquiries across all Iranian DPICs during 2014-2015 (16). Nevertheless, UptoDate® remains a widely popular and prominent tertiary resource employed by both pharmacists and physicians (19, 20).

The majority of poisoning cases documented in DPIC were attributed to medicinal agents, aligning with findings reported in various studies across Iran (2, 7, 8, 16, 21). This prevalent trend may be linked to the high prevalence of self-medication in Iran, reaching 53%, a figure notably higher than in many other countries worldwide (22). In Iran, current legislation strictly prohibits the dispensing of prescription-only drugs without a valid prescription. However, the prevalent practice of self-prescription persists due to lax enforcement in pharmacies (23). Addressing this issue requires careful planning and the implementation of policies.

The data was collected from a single center in Iran, so the results may not be generalizable to other settings. The data was also collected retrospectively.

In conclusion, DPIC of Hamadan School of pharmacy received an average 78.08 questions each month within a four-year period. The majority of inquirers were female. Corona virus and psychiatric agents were the most common type of queries and drug classes, respectively. UptoDate® is the most commonly used reference for answering questions. Given the limited number of calls received from healthcare professionals, there is a need to enhance awareness and utilization of DPIC services which may contribute to the prevention of medication errors. It is recommended that the government allocate additional funds to promote DPICs within the community. Employing more manpower and expanding working hours are also two factors that can alleviate the services provided by DPIC.

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