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Performance of Drug and Poison Information Center within a Referral University Hospital in Southwest of Iran

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ABSTRACT

Background: Drug and Poison Information Centers (DPICs) provide quick, easy, valid and reliable access to medication and toxin information for professionals, health workers and the public. The purpose of this study is to report the services provided by a university hospital DPIC within 1 year.

Methods: This descriptive study reports all scientific questions asked from DPIC of "Namazi" hospital in Shiraz from the September 2016 to the August 2017. The information include the number of questions, the ward that ask the question, the questioner's profession, the method of asking questions, the method of responding, the type of question, and the resources used to answer them. After extraction of duplicates, data were analyzed by using the Excel software.

Results: The total number of contacts registered during the study period was 485. The most number of questions were received in the June 2017 and the lowest in October 2016. Major questions were asked from the health-care team working in Namazi hospital and mostly from the nursing group (49.8%). Most of the questions (80%) were asked and responses were provided (67.3%) by the telephone device. Of all incoming inquiries, drug indication (13.3%), adverse drug reactions (ADR) (13.3%), storage (11.8%), and the method of preparation as well as administration (11.7%) were among the most common types of questions. The most frequent ward in asking questions was the pediatric intensive care unit (13%). The most widely used drug information resource to answer questions was the UptoDate® (47.5%).

Conclusion: DPIC services in the hospital settings can decrease or prevent ADRs as well as medication errors, improve the pattern of medication use, and result in cost saving.

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Introduction

Drug and Poison Information Centers (DPICs) provide quick, easy, valid and reliable access to medication and toxin information for professionals, health workers and the public (1,2). Based on the available data, these centers can help to early identify and prevent adverse drug reactions (ADRs) along with optimize the use of drugs (3-5). Also, DPICs can have beneficial effects on clinical outcomes (6). By the introduction of new drugs into the market, it is necessary to promote knowledge of health care professionals about different aspects of drug information. In addition, the need to these centers has been specially felt in countries with the limited access of physicians, pharmacists and other providers of health services to drugs and poisons information sources (7).

The first DPIC was established in 1962 at the University of Kentucky in the United States (8). After that, the number of these centers gradually increased. The first DPIC in Iran has been established in the early 1995 as a part of the Food and Drug Organization (FDO) under the supervision of the Ministry of Health (MOH). Currently, there are 38 DPICs across the country, mainly supported by the FDO of MOH (9). DPIC of the "Namazi" hospital was established on August 25th, 2016 with the co-operation of the Food and Drug Administration chancellor and Namazi hospital manager along with the scientific supervision of the Clinical Pharmacy department affiliated to Shiraz University of Medical Sciences. The purpose of this study is to report the services provided by the Namazi hospital DPIC to the health care providers, and the general population during a one-year period.

Methods

This descriptive study retrospectively reports the scientific questions from the DPIC of "Namazi" hospital, a general multispecialty, referral, tertiary health-care setting, affiliated to Shiraz University of Medical Sciences, Shiraz, Iran, during 12 months from the September 2016 to August 2017. This center provides information and advice on medications and poisoning every day for both health-care professionals and patients in one working shift (from 8 am to 14 pm) except for official holidays. A trained pharmacist using relevant drug information resources (online, software, and/or hard copy) under the supervision of a clinical pharmacist answered inquiries. All scientific questions and relevant answers were registered in a structured data collection form. All calls were also recorded for educational purposes. The accuracy and quality of pharmacist answers were evaluated by the clinical pharmacist through reviewing all forms and randomly listening to the recorded calls. Clinical pharmacist residents spending a 1-month mandatory educational rotation at the DPIC of Namazi hospital to learn the principles of drug information service and become familiar with drug information references. They also prepared a monthly newsletter about pharmacotherapy updates or new drugs that is available online from http://namazi.sums.ac.ir/research-education/pharmacology/newsletter/index.html.

Questions about the medication price, medication shortage, diagnosis of a disease, and interpreting laboratory data are outside the scope of Namazi hospital DPIC activities.

The information considered in this study include: 1) client demographics (sex), 2) type of client (public versus health-care professionals), 3) the number of questions per month, 4) name of wards (in the case of health-care professional questions), 5) the questioner's profession (e.g., physician, pharmacist, nurse), 6) the method of asking the question (e.g., telephone call), 7) the method of offering responses to clients (telephone, Email, fax), 8) the type of question (route of administration, preparation and storage, indication, adverse drug reaction, dosage forms, alternative medication, drug interactions, physical/chemical compatibilities, and use in pregnancy and lactation), 9) therapeutic or chemical class of medication relevant to the question, 10) time needed to find and provide answers, and 11) references used to answer questions. In this study, after extraction of repetitive questions, data were analyzed by using the Excel software (Microsoft Corp., Redmond, WA, USA).

Results

The total number of questions recorded during the study was 485. The mean number of questions per month was 40.4. Most questions received in the June 2017 (13.1%) and the lowest was in the October 2016 (4.3%) (Figure 1).

More than three-fourth (79%) of clients were females. Most questions were asked and answers were offered by the telephone (80% and 67.3%, respectively) (Figure 2). Most answers (91.9%) were given to clients within 30 minutes after the question. Major questions (89.7%) were asked from the health-care team working in the hospital. Among health-care team, nursing staff include about half of clients (49.8%) (Figure 3). The most number of in-hospital questions were from pediatric intensive care unit (13%) followed by neonatal intensive care unit (6%), and central hospital pharmacy (5.9%).

According to Table 1, medication indication (13.3%), adverse drug reactions (13.3%), storage conditions (11.8%), preparation as well as administration (11.7%), and alternatives (11.5%) are the five most frequent types of inquiries. Apart from miscellaneous category, most questions were asked about cardiovascular drugs (23.7%) and antibiotics (19.6%) (Figure 4). The most common reference used to answer questions was UptoDate® (47.5%) (Table 2).

Discussion

In this study, services provided by the DPIC of Namazi

Table 1. Type of questions to the Namazi hospital DPIC from the September 2016 to August 2017.

Question type	Percent
Adverse drug reactions	13.3
Indication	13.3
Storage & Stability	11.8
Preparation & Administration	11.7
Alternatives	11.5
Dose adjustment	11.2
Identification of the drug	6.4
Contraindications & Precautions	4
Drug interactions	3.8
Use in pregnancy and lactation	3.5
Extemporaneous products	3
Intravenous compatibility	2
Poisoning	1.5
Medical equipment	1.1
Qualitative problems of medications	0.8
Request to send articles	0.8
Mechanism of action	0.2
Pharmacokinetics and Pharmacodynamics	0.1

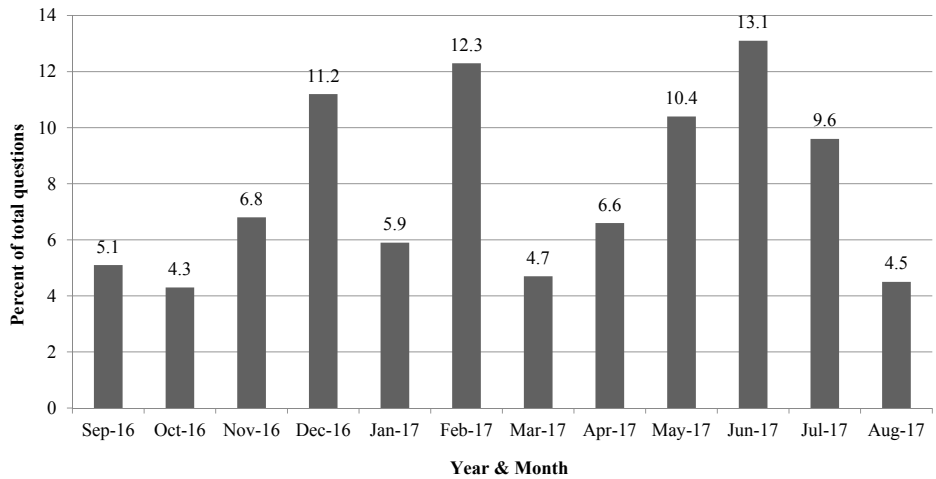

Figure 1. The distribution of questions to the Namazi hospital DPIC in each month from the September 2016 to August 2017.

hospital, as one of the referral clinical settings in Iran, were evaluated. The number of annual calls to our center is much less than that from other DPICs in Iran. In this regards, Shadnia et al., reported 2,671, 2,576, and 4,447 calls to the Loghman-Hakim hospital DPIC in Tehran in 2006, 2007, and 2008, respectively (10). This rate was 46,734 and 63,576 in a 2-year period from July 2010 to June 2012 at 13-Aban DPIC in Tehran (11). The average calls per day to the national DPIC in Iran were 470 (9). This variation can be partially justified by the difference in the scope and client of DPICs (public versus health care professionals), working time of DPIC within a day or week, and history of providing services by the studied DPICs. Regarding the second issue for example, other DPICs working full time (24 hours) and 12 hours/day (non-holidays) or 24 hours/day (official holidays) (10,11). However, our DPIC only covers a 6-hour shift in non-holidays.

Our results demonstrated that the most (13.6%) and least (4.3%) number of questions were asked in the July 2016 and October 2017, respectively. This can be partially due to fact that more hospital health care professionals become more aware and familiar with this center and its activities. Similarly, Entezari-Maleki et al., reported that the number of calls to their DPIC significantly increased during 1 year (11). This issue highlights the importance of introducing DPIC's services and its benefits to health care professionals.

The majority of questioners in our study were female (79%). This is in agreement with the reports from other DPICs in Iran (9-12) as well as other parts of the world (5, 13). This is an expected finding due to relatively more time flexibility, attention, vigilance, conservative behavior, and somewhat more sense of responsibility in women than men.

Considering the fact that communications in our DPIC is generally telephone-based, it is not surprising that most questions were asked and answers were given through the telephone device. Most responses in the Namazi hospital DPIC were provided within 30 minutes. In line with this finding, Shadnia et al., reported that about 98% of queries in the Loghman-Hakim hospital DPIC in Tehran were answered within 30 min (10). Although rapid responding to inquirers is welcoming and necessary especially in the hospital setting, it should be accompanied with the correct and complete response.

Our results showed that nursing staff encompasses about half of Namazi hospital DPIC clients. In contrast, Entezari-Maleki et al., reported that among health-care professionals, pharmacists (39.8%) were the most clients followed by general physicians (11.3%) and nurses (4.6%) (11). This can be partially explained by the location of our center in the hospital in comparison to Entezari-Maleki et al., DPIC located in a community pharmacy. Furthermore, considering the fact that storage conditions and preparation as well as administration are among the most frequent type of questions in the current study, the role of nurses as the major clients to our DPIC can be justified. In accordance to other studies from both our (9-12) and other countries (13-16), medication indication is among the most common type of questions asked from Namazi hospital DPIC. Although ADRs are among the most common type of questions asked from our center, pharmacovigillance in hospitals needs more attention and planning based on the underreporting of ADRs in Iran (17). DPIC has been demonstrated to be a reliable and valuable database for drug safety surveillance (18).

According to fact that antibiotics and cardiovascular agents are among the most commonly used medications especially in the hospital settings and on the other hand, the relatively high turn-over and introduction of new cardiovascular medications to the market, our findings on the most common drug classes that questions were about them can be expected and justified. In the same manner, 1 hospital and 2 community DPICs in Iran identified antibiotics as the most frequent drug class that questions were asked about it (9,10,12). According to various data reported from the food and drug organization of MOH, the rate of prescribing antibacterial agents is about four times higher than average usage in the world (19). In addition, based on the last National Rational Drug Use Committee official report in 2010, beta lactams and cephalosporins including amoxicillin, cefixime, and penicillin 6.3.3 are among the 10 most commonly prescribed medications by physicians in Iran (20).

The most commonly used reference for answering questions in our center is UptoDate®. This is similar to Entezari-Maleki et al., study at 13-Aban DPIC in Tehran (11). Whereas, Shadnia et al. reported Micromedex® Healthcare Series as the most frequent information resources used in the Loghman-Hakim hospital DPIC in Tehran (10). This difference can be due to fact that Loghman Hakim-Hospital is a referral center for poisoning in Iran and Micromedex® appears to be more comprehensive and dedicated drug information resource compared to UptoDate® in the case of drug poisoning. Ghane et al., did not report this item from the national DPIC in Iran in their first study (9). However in the second report, Micromedex® was the most commonly used reference to answer the inquiries during 2014-2015 from all Iranian DPICs across the country (12). Anyway, UptoDate® is one of the most popular and prominent tertiary resources used by both pharmacists and physicians worldwide (21,22).

The present study has a number of drawbacks. First, the real clinical and economic impacts of our services such as decreasing or preventing ADRs as well as medication errors, improving the pattern of medication use, and cost saving were not determined. Second, the satisfaction level of inquirers with our center service was not evaluated. Finally, data about age of inquirers was not available.

Table 2. References used to answer the questions of Namazi hospital DPIC from the September 2016 to August 2017.

Reference	Percent
UptoDate® software	47.5
Package insert of medications	12.7
Practical Handbook of Injectable Drugs (Dr Karimzadeh), 3th edition	12.4
Micromedex® software	11.8
Darooyab.ir	5.2
Scientific articles	4.6
Dr. Kheirollah Gholami's Book Collection	3
Martindale: The Complete Drug Reference, 38th edition	1.1
Koda-Kimble and Young's Applied Therapeutics: The Clinical Use of Drugs, 10th edition	1
Drug-Induced Diseases: Prevention, Detection, and Management, 2nd edition	0.5
Dr. Hossein Khalili's Book Collection	0.2

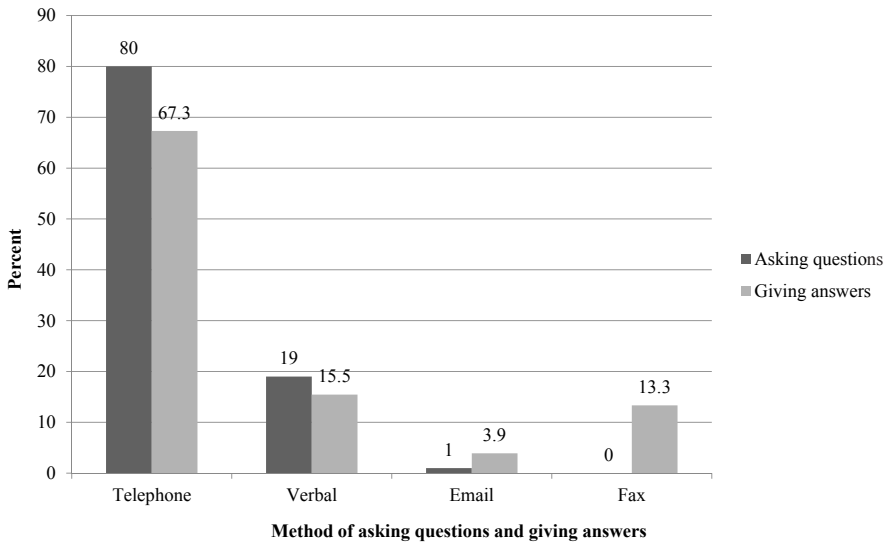

Figure 2. Methods of asking questions and giving answers in the Namazi hospital DPIC from the September 2016 to August 2017.

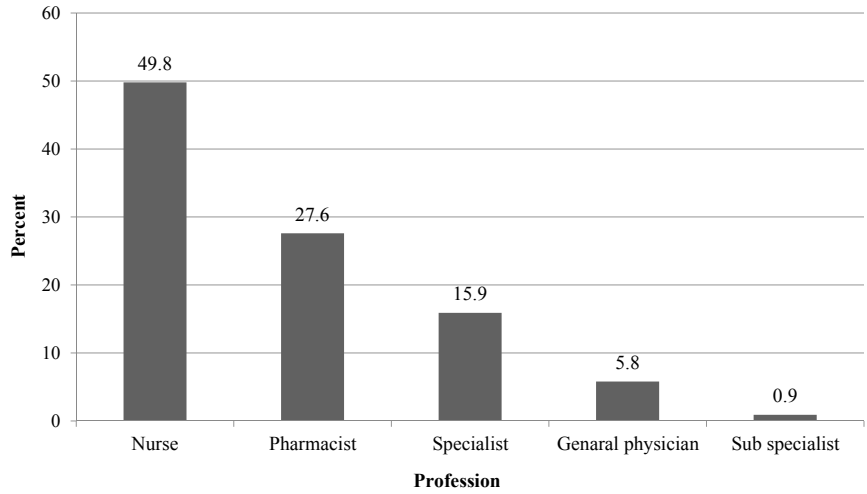

Figure 3. Profession of health-care team inquirers from the Namazi hospital DPIC from the September 2016 to August 2017.

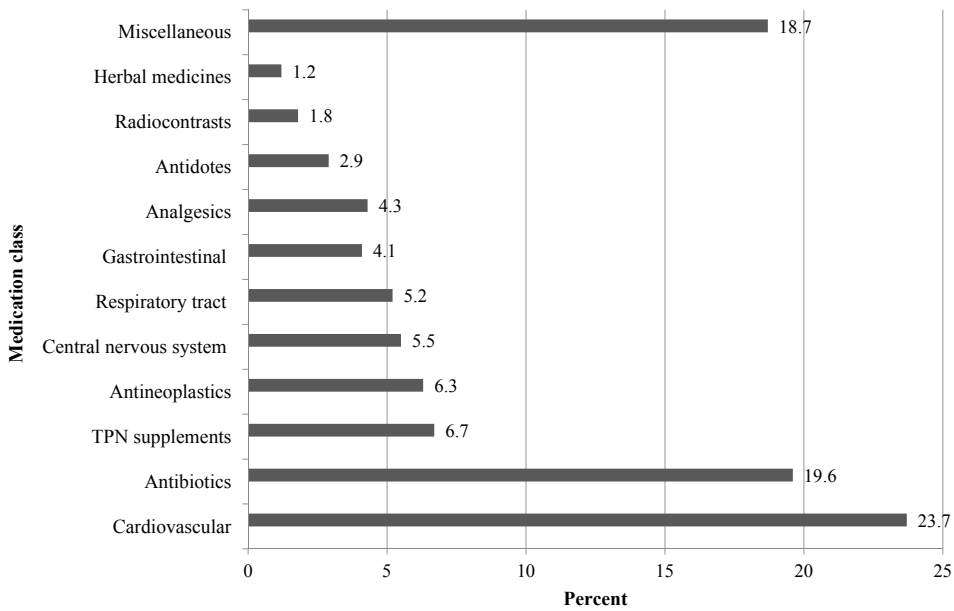

Figure 4. Distribution of questions to the Namazi hospital DPIC from the September 2016 to August 2017according to medication class.

In conclusion, our DPIC in Namazi hospital received an average 40.4 questions per month within a one-year period. The majority of questioners in our study were female. Among healthcare professionals, nursing staff are the most common clients of our service. Indication and antibiotics were identified as the most common type of question and drug classes that questions were about them, respectively. UptoDate® is the most commonly used reference for answering questions in our center. Expanding the working time of our center (for example to 12 hours a day), persistent presence and supervision of clinical pharmacist attending or residents, introducing its activities and outcomes to healthcare professionals at regular intervals, and collaborating with similar local and national DPICs can be considered as practical approaches to improve both the quantity and quality of Namazi hospital DPIC functions.

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