Review Article

Drug information center in India: Overview, challenges, and future prospects

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Abstract

Medicine is a forever-evolving science and commands continuous research. Pharmacologists and pharmacists contribute various amounts of medicine-related information to physicians, while clinicians face challenges in evidence-based medicine practice due to several reasons such as overloaded number of drug approvals, as well as the enormous quantity of scientific research data in medical journals published every day, making it more complicated for doctors to stay updated with the current advancements. This in addition, results in the call for more sophisticated crisis-targeting skills in order to respond to the more complex clinical difficulties that brazen out practitioners today. The drug information center (DIC) service run by Department of Pharmacology is the bridge between doctors by providing accurate, unbiased, up-to-date drug information for better patient care. Novel initiatives, such as antibiotic stewardship programs, therapeutic drug monitoring, pharmacovigilance, and materiovigilance are being considered by Department of Pharmacology. On a similar note, DIC activities have a huge potential to fit in as an integral part of pharmacology curriculum. Undergraduate, postgraduate, and superspeciality pharmacology curricula are deficient in formal teaching of evidence-based medicine. Western countries have been running variety of courses on drug information like residencies , fellowships for the training of pharmacy, pharmacology postgraduate students for last four decades. This is the need of the hour for a country like India to inculcate such practices for promoting rational use of drugs. This review will highlight how pharmacology and pharmacy curricula can be upgraded so as to contribute for improvement of rational therapeutics in the era where alternative medicines are also considered by patients in disease management.

Keywords: Drug information center, evidence-based medicine, pharmacology

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INTRODUCTION

There is a specter haunting today's world; the specter of overload of information. This has not spared the medical field too, and it is associated with two challenges: first, the increased accessibility of medical information to patients without a quality check[1] and second, the doctors and medical personnel are being bombarded with information in the form of research articles published in journals as well as innumerable websites that pop up every day.[2] Development of science and research led to opening of new avenues and new inventions every day.[3] On an average, more than 7000 research articles are being published in all medical

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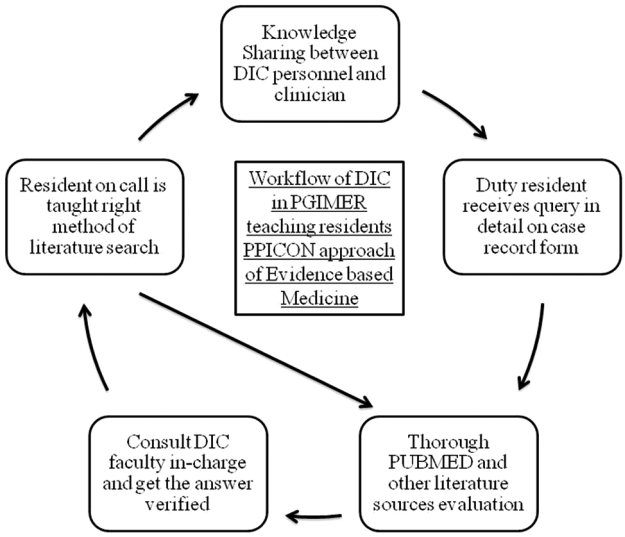

Figure 1: Workflow of drug information centre in PGIMER chandigarh

journals per specialty. It means 17 h/day are required for mere reading of these articles. If we assume that a clinician spends 6–8 h/day for patient care, it is humanly impossible to keep up to date with information.[4] Having recognized the problem of accessibility to the apt information that is appropriate for a given clinical situation, the USA has taken the first initiative to establish a drug information center (DIC) at University of Kentucky Medical Centre in 1962, with an objective of providing wide-ranging drug information to the physicians and dentists.[5] Thereafter, the first conference on drug information services was held in 1964.[6] By 1967, developed countries began various drug information courses.[7] In 1985, the WHO held a conference of experts in Nairobi with the theme of "Rational use of drugs." This strongly emphasized the flow of drug information to physicians and the need of hospital-based DICs.[8] Such services are of utmost importance in providing accurate, current, unbiased information for improvement of rational use of drugs and providing effective safe drug therapy based on evidence-based medicine. India adopted the idea of providing DIC services for medical professionals in Karnataka initially in 1997 by Karnataka State Pharmacy Council. Few other states like as Andhra Pradesh, Maharashtra, Chattisgarh, and Rajasthan also adopted the idea of DIC. Two decades have passed, yet there are only few centers providing DIC services, and the concept of DIC in India is still in its infancy.[9] In this article, we explore the scope of services provided by the DIC and their possible utility and challenges of establishing DIC in academic and nonacademic medical institutions in India.

WHAT IS A DRUG INFORMATION CENTRE?

DICs are defined as operational units that provide up-to-date scientific and technical information on medicines in an objective and timely manner. They represent an optimal strategy to address specific needs for information sought by health-care professionals. Ideally, DICs have adequate sources and specifically qualified professionals, who provide independent and appropriate information to the queries.[10] The users can contact the center by telephone, personally, fax, or e-mail and their queries are answered in verbal or structured written format.[11]

DIC services are rendered both in proactive and reactive approaches. The reactive approach [figure 1] is commonly followed in hospital based DICs which serve health-care providers (doctors) by answering time-critical questions on the safe and effective use of therapeutic and diagnostic pharmaceuticals. The sample case record form [Box-1] for recording the communication is presented here as a supplementary file at the end of the article. Proactively, some DICs also publish and circulate regular updates on various topics such as dosing guidance in organ impairment, interpretation of therapeutic drug monitoring (TDM) levels, possible drug–drug or drug–disease interactions, safety profile including the Food and Drug Administration (FDA) alert, adverse event linked to a drug, efficacy comparison, recent updates in treatment guidelines, new drug approvals and local availability, drug use in any special situation, important study findings in reputed journals, guidance on procuring already approved drug in other countries, and many more types of questions from available literature sources.[8,9,12]

While most DICs cater to the health-care professionals, community-based DIC services provide patient counseling regarding drug use, conduct public awareness lectures, publish articles in newspapers, and answer queries on phone except commenting on prescription. A DIC Established in 2001 in Dresden, Germany, in 2001, that catered exclusively to patients, reportedly received 5587 inquiries between August 2001 and January 2007.[13]

ORGANIZATIONAL STRUCTURE, RESOURCES, AND FUNCTIONING OF DRUG INFORMATION CENTER

The organizational structure of DIC can vary considerably. A survey of DICs of 18 European countries had reported that they are mainly affiliated to hospitals (68%), but rather uncommonly with state departments (15%), other health-care organizations outside the hospital (12%), and faculty of pharmacy (6%).[14] Similar findings were also reported in an American survey carried out on 151 DICs.[15]

Within medical institutions or universities, DICs are usually affiliated with the Department of Pharmacology/Clinical

Pharmacology or Clinical Pharmacy. The location of the DIC within the hospital has the advantage of being close to the different specialized departments, patient care areas, the hospital library, and the hospital pharmacy. Such a close proximity to different departments and service areas enable easier contacting.[16] They are usually staffed by clinical pharmacologists and pharmacists who review the queries of the clinicians, search the literature, and provide the information sought, in structured, evidence-based manner.[17] In certain centers, the DIC is manned by faculty members and postgraduate students of pharmacy practice.[18] In some places, DICs also provide poisoning-related information and primarily act as poison information centers.[19] The availability of qualified individuals to run the DIC is of paramount importance as they act as the first interface with the health-care professional. Proper communication skills, literature search and appraisal skills, and knowledge about the efficacy and safety of drugs are very important in order to provide quality services to those who contact the DIC.[20]

The staff of the DIC employs various resources such as the summary of product characteristics of the respective drug and the international drug databases such as DRUGDEX and DRUG-REAX interaction system to search for specific responses to the queries. Other online sources are available such as Facts and Comparisons, Martindale, Lexicomp Online, and FDA information for consumers and books such as Goodman and Gilman's the Pharmacological Basis of Therapeutics and Meyler's Side Effects of Drugs.[21] Various mobile phone-based applications such as the Drug Essentials application, Epocrates application, or Medscape application are also low-cost resources of information. Subscriptions to most of these mobile applications are priced <$10 per month.[22]

The requisitions received by the drug information units are recorded in a standard form (Presented at the end of the article in box-1) that includes information on the details of the inquirer; the questions asked and its urgency; patient details relevant to the question; the time and mode of response; the response provided; the reference materials used for preparing the response; and the signature and name of the staff providing the response.[16]

NATURE OF INFORMATION SOUGHT FROM DRUG INFORMATION CENTER

There are many reports on the quantum and nature of inquiries received by the DIC around the world. A study from a regional DIC in Germany reported that questions concerning therapeutic use (34%), adverse drug reactions (28%), pregnancy/lactation (16%), and pharmacokinetics/dosage (15%) were asked most frequently. The major users of the DIC were internists (19%), general practitioners (19%), pediatricians (18%), and gynecologists (11%).[23] A similar pattern had been observed in a study in Slovak Republic, where questions concerning pregnancy/lactation (25%), adverse drug reactions (16%), basic information regarding drugs (14%), and interactions (13%) were frequently asked.[24] A study in a DIC in South India reported that questions most commonly asked were regarding dosage and administration (27%), adverse reactions (24%), and drug therapy (15%). Queries were also asked on many occasions for other purposes such as availability/cost, drug interactions, pharmacokinetics, pharmacodynamics, pregnancy and lactation, indication, content, contraindication, generics, drug profile, and poisoning.[18] Similar trends have also been reported in various analyses conducted in Nepal,[16,24] Iran,[25] Italy,[26] Israel,[27] Mexico,[28] and Finland.[29] The nature of queries to community-based DICs differs slightly from the hospital-based ones. A study in Finland analyzed and described the utilization of a community pharmacy-operated national drug information call center. Data were recorded for 2196 calls, 56% of which were drug related. The majority (83%) of these calls were therapeutic or pharmaceutical inquiries, with 26% concerning costs and reimbursements, 14% interactions, 14% dosages, and 11% related to adverse effects.[30] A recently published study on a Brazilian community-based DIC managed by the Federal Council of Pharmacy reported that mostly information on drug administration, indications, drug interactions, and legislations was sought from the DIC by pharmacists and pharmacy students.[10] The DIC in Dresden, Germany, that caters exclusively for patients has been frequently contacted for information pertaining to adverse drug reactions (22.1%), general information about prescribed drugs (19.9%), information about therapy (12.4%), and drug interactions (10.2%).[13]

CHALLENGES IN ESTABLISHING A DRUG INFORMATION CENTER IN INDIA

Although establishment of DICs offers benefits in terms of addressing the awareness gaps of health-care professionals and improved patient care, there are many challenges that have to be encountered while setting up these centers.[31]

Funds and resources

In resource-limited developing countries, the major hurdle in establishing a DIC comes in the form of constraint of funds.[16] Establishing and running DIC services

Table 1: Budget for establishing and running drug information center services

Basic nonrecurring requirements	Basic recurring requirements
Office space Furniture (tables, chairs, etc.) Computers Printers Scanners Telephone line setup Fax line setup Internet connection Electricity supply, etc.	Annual subscription to drug databases (as mentioned in this article) Subscription to journals, books, drug bulletins Telephone bills Fax rolls, printer cartridges/ink Internet bills, etc.

successfully requires a good supply of recurring and non-recurring budgets, as mentioned in Table 1.

Since DICs in hospital settings are affiliated to clinical pharmacology/pharmacy departments, the expenses are usually borne out of the departmental budget. Since departmental budgets in such disciplines are already low in India, the expenses may act as a deterrent to the establishment of a stand-alone DIC.[32]

Therefore, in addition to drug information, the DIC could also provide other value-added services such as poison information, adverse drug reaction monitoring, and training of postgraduate students of concerned and allied disciplines to justify its budgetary requirements. For example, the National Poisons Information Centre at AIIMS, New Delhi, established in 1995 in the Department of Pharmacology under the INTOX project of the International Programme on Chemical Safety/WHO provides round-the-clock information on poisoning, drug reactions, and analytical services on an emergency basis to help in diagnosis and management. It also provides training to residents posted in the center.[19]

Other funding models have also been explored to sustain the functioning of DIC. The DIC at Huddinge University Hospital was created in 1974 with initial support from the Karolinska Institute. However, after 2 years, the financial responsibility for maintaining the service was taken over by the Stockholm County Council.[17] The feasibility of subscription-based DIC services however has not been studied in developing countries.

Human resource

Providing quality drug-related information requires employment of trained and experienced individuals in the DIC. However, there is a dearth of such individuals within academic hospitals. Annually, only 15–16 students get trained in the D.M. Clinical Pharmacology course and approximately 550 students get trained in M.D. Pharmacology. These trainees are absorbed into the pharmaceutical industry, and only a few enter academic institutions.[33] This is compounded by the fact that the same faculty has to teach dental, nursing, and other paramedical courses, leaving little time to serve in the DIC.[34] To counter this lack of human resource, it has been suggested that there could be dual appointments of teachers from clinical specialities, public health departments, or industry in clinical pharmacology in academic institutions and increase in the number of students enrolled per teacher and in the number of departments of clinical pharmacology.[33]

A study from Brazil has suggested that a 5-week DIC training module was an effective tool for teaching evidence-based medicine to pharmacy students. A survey of DICs in the USA reported increased involvement of DICs in the residency program. It was suggested to be the result of the Residency Learning System model established in 1996 by the American Society of Health-System Pharmacists (ASHP), which included drug information and drug policy development as one of the four core areas of competency required by pharmacy practice residents. Similar approach of introducing drug information residency/fellowships for training of postgraduate students can also be followed in India to overcome the deficiency of trained workforce and also provide round-the-clock services in the DICs.[35]

EVALUATION OF PERFORMANCE OF DRUG INFORMATION CENTER

Evaluation of drug information services has been widely performed through the assessment of the processes against predetermined standard criteria, the assessment of user satisfaction, or the evaluation of clinical and economic outcomes.[11] However, the survey of DICs carried out in the USA reported that only half of the DICs surveyed had a formal quality assurance program.[15] The national German drug information service conducted a user's satisfaction study and concluded that there was high satisfaction among users, based on quality, understandability, timeliness, and helpfulness regarding counseling.[36] Response time to queries is a major determinant of user satisfaction.[37]

In Israel, Lustig reported that the mean response time varied according to the type of query; 1 min was the lowest response time for queries regarding the availability of products and 13.5 min was the highest response time for answers to questions on drug indications and interactions. In South India, George and Rao categorized the time needed to reply into three categories: immediately, within 2–4 h, and within a day or 2 days.[28,11] A modeling study predicted that the most important workload factor

Box-1: Drug Information Center (DIC)

Room no. xxxxx, Landline no. xxxxxx Mobile no. xxxxxxxxxxxxx

Department of Pharmacology/Pharmacy, xxxxx x xxxxxx Medical/Pharmacy College (state)

Query No.			
Date of query:	Date of response:		
Time of query:	Time of response:		
Name of inquirer:	Designation:		
Department:	Contact No:		
Level of urgency – Urgent/routine			
Query via Telephone/email/Whatsapp/mobile:			
Query: Objective/Subjective (question details)			
Patient-related information:			
Age/Sex:	Diagnosis:		
Relevant investigations:			
Treatment received:			
Generic/proprietary name of drug:			
Answer:			
Reference:			
Source used for literature search:			
JR/SR:	Consultant:		
Information provided is [Tick at appropriate]:			
Excellent:	Satisfactory:	Nonsatisfactory:	Poor

predicting the time spent in handling the queries was the type of literature search that had to be performed. The categorization of queries, as judgmental or not, also affected the time spent answering the queries. However, the number of drugs involved did not seem to significantly influence the time spent in answering drug information queries.[37]

Although Chauhan *et al*. have stated that there are 36 functional drug or poison information centers in India, there is hardly any study evaluating their performance or user satisfaction.[9] At the very least, hosting an annual summary of queries received by the DIC on the institute's website could provide some insight about the working of these centers. In addition, periodic surveys by leading DICs in the country can possibly provide information on staffing, services, and funding pattern of these centers.

Future prospects

Although DICs have existed since the 1960s, their full potential has not been explored, especially in developing countries. Although future growth in the number of centers will be limited, their present activities will become more refined and productive if the above-mentioned challenges are appropriately addressed.

DICs can also provide information about complementary and alternative medicines, which would especially be beneficial in developing countries where a large number of patients consume these medicines.[38] In India, DICs within academic centers can collaborate with the existing in-house department of complementary and alternative medicines (AUYSH) to provide such information.

Novel initiatives such as providing TDM service, adverse drug monitoring and collaboration with forensic scientists for identification of illicit substances, forensic pharmacology, postmortem toxicology, and providing expert testimony have been successfully tried in Denmark and can be replicated in India too.[39] Other activities such as online or offline academic detailing where specially trained pharmacists/pharmacologists with detailed medication knowledge interact with physicians to share the best practices of prescribing have been described as a means of promoting evidence-based medicine practices and rational use of drugs. Such activities may also yield positive results if tried in Indian setting.[40,41]

A sample case record form for recording the communication:

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Conflicts of interest

There are no conflicts of interest.

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