

AN OVERVIEW OF DRUG INFORMATION CENTER – FUNCTIONS AND CHALLENGES IN INDIATHIREESHA P¹, MOUNIKA K¹, PRAMOD KUMAR ADUSUMILLI^{1*}, SRI HARSHA C²¹Department of Pharmacy Practice, Chebrolu Hanumaiah Institute of Pharmaceutical Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India. ²Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education and Research, Mysuru, Karnataka, India. Email: pramodkumar.adusumilli@gmail.com*Received: 06 February 2020, Revised and Accepted: 23 March 2020***ABSTRACT**

Drug information has been providing data on drugs that are being used in the health-care system. It also bears dosing, adverse drug reactions (ADRs), side effects, pharmacokinetic parameters and educating the health-care professionals and managing drug shortage, identifying alternative treatments, and developing alternative protocols for restrictive use. The Moto of drug information is to contribute genuine, precise, appropriate, impartial drug information to the patients, nursing staff, practicing physician, pharmacist, and other health-care professional. Drug information regularly responds to inquiries from patients, health-care professionals. The drug information center routinely receives queries from hospital staff, patients, and responds to queries regarding ADRs, drug interactions, pharmacokinetic parameters of drugs, and information on new drugs available in the market. Drug information services help in improving patient safety, minimizing drug-related issues to the patient, and rational use of drugs by both physician and patient. Drug information services are providing unambiguous data with a well-trained and registered clinical pharmacist. Most of the developed countries are using this service successfully. In well-developed countries, these centers provide accurate and up to date drug information to health-care professionals within minutes. However, developing countries like India need to pay more attention to the services. Information present in this paper not only enlightens the drug information services but also on the future aspects that need to be taken.

Keywords: Drug information services, Drug-related queries, Clinical pharmacy, Hospital pharmacist.

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INTRODUCTION

Drug information is defined by its role in providing information about drug therapy and drugs in response to a request from various health-care providers, patients, organizations, committees, and public community either by verbally or written form. Providing accurate and detailed information about drug use to the pharmacists is the primary activity carried out by drug information services [1]. To meet the needs of practicing health-care practitioners, pharmacists and physicians drug information center (DIC) provides an unbiased, in-depth source of important drug information [2].

Some of the reasons contributing to the irrational drug use in India are lack of independent unbiased drug information and poor drug regulation. DIC section is designed for receiving, collecting, analyzing, and providing unbiased, specific and up-to-date information regarding drugs and their use [3,4]. Due to the limited resources available about updated drug therapy, it is very crucial to promote rational use of drugs for 40% of the health-care services where the major proportion of the budget is consumed by medicines [5]. The first DIC was opened at the University of Kentucky medical center in 1962, which aims to provide a selective and comprehensive source of drug information for the dentists, staff physicians and also to meet the needs of nursing staff thereby, which allows them to compare and evaluate various drugs [6].

The important key factor involved to ensure safe and effective use of drug therapy is to provide accurate and timely drug information to health-care professionals [7]. The main purpose in running DIC is to promote rational drug therapy by providing unbiased, current, and accurate information [8]. The center also provides relevant information to physicians and faculty of the medical academy on their request on evidence-based medicine. If the center's actions are independent from government and pharmaceutical industry, Drug information centers (DIC's) must not only provide information of good quality but can also improve patient outcomes [9]. The World Health Organisation (WHO) supports and encourages to develop independent DIC's as a core

component of national health-care programs to ensure quality health care and to promote rational use of drugs [10,11]. Some studies have shown that physicians and pharmacists are the most commonly used sources of Drug information (DI) for patients [12-14].

The various current advancements that are being performed in the medical sciences are providing enormous information about drugs and diseases regularly. Unfortunately, the advances being made in drug therapy are creating void information for health-care professionals and patients. This mainly contributes to the misuse of drugs. Therefore, drug information services are intended to help all in need of evidence-based timely critical information [15].

Conventionally, pharmacists are involved in a product-oriented stream of pharmaceutical care, but recently the current role of pharmacists had changed to patients as part of clinical pharmacy service. This helps to fulfill any gap that may arise between doctors and patients when medicines are being prescribed [16]. Thus, pharmacists had unique and sole responsibility in providing drug information as part of their professional duties [17].

While practicing clinical pharmacy services in DIC, pharmacists have to cope with the available latest vast information about numerous formulations and new drugs that are being entered into the market [18]. In India, irrational use of drugs is common, and this has led to antibiotic resistance, adverse drug reactions (ADRs), drug interactions, and other drug-related problems [19]. The national policies in India are industry-focused rather than health-focused. The DIC work as a providing place for updated information with scientific literature related drugs used for diagnosis, prevention, and treatment of disease [20]. Therefore, it is very essential to spread awareness about various services that are being provided by DIC [21].

This article helps in a better understanding of the various functions to be carried out at DIC and the several measures to be taken while establishing a DIC in Indian settings.

SOURCE OF INFORMATION AND SEARCH STRATEGY FOR IDENTIFYING RELEVANT STUDIES

To ensure a comprehensive research review of the subject, we performed searches using terms such as medical subject headings and key text words, such as "DIC's," "DIC," and "drug info." Thus, the abstracts of published studies with relevant information on the DIC were identified. These terms were used individually and in combination to ensure an extensive literature search. Relevant articles were selected and collated based on the broader objective of the review. This was achieved by searching databases, including SCOPUS, Web of Science, and Embase. From this common methodology, discoveries and findings were identified and summarized in this final review.

The objectives of DIC are:

1. To meet the needs of health-care practitioners by providing an organized database source of information on specialized medicines
2. To provide unbiased medicinal information to the pharmacists, physicians, and other health-care professionals working in the hospital field and community field
3. To serve the community-based health-care professionals by answering about various drug-related queries
4. To recognize and guide about the importance of evaluation and also to monitor about the quality of drug information
5. To educate and guide pharmacy graduates and to serve them as effective providers on medicinal information [22]
6. To define the basic requirements for establishing DIC at various levels
7. To provide a learning center about drug information skills to student pharmacists and residents, and other health sciences students [23]
8. To aid in the promotion of clinical pharmacy health-care services by offering drug information services throughout the state.
9. To promote the profession of pharmacy in various health-related fields [21]
10. To provide evidence-based practice by promoting patient care through the rational use of medicines [24]

The functions of DIC are:

1. When there is no sufficient time for accurate research, it provides information to the health-care professionals and contributes to update their knowledge about drug information
2. Maintain and establish custom based on scientific evidence of effectiveness and well-being, pharmacoconomics, and institution-specific factors
3. To improve patient outcomes DIC coordinates and supports various programs on population-based medication practices (e.g., development of guidelines for pharmacotherapeutic, evaluation criteria therapeutic usage, and therapeutic interchange protocols)
4. Develops various efforts to prevent medication errors and adverse drug effects, which includes surveillance and ensuring institutional compliance to risk evaluation and mitigation strategies, and leading reporting and analysis programs (e.g., MedWatch).
5. The medication safety alerts communicated by the Food and Drug Administration (FDA), drug manufacturers, and other sources are been monitored and assessed
6. Drug information is provided to various health-care professionals, sufferers, and caregivers. It also extended its services in coordinating investigational services by evaluating protocols and participating in institutional review board committee
7. Identify and manage alternative treatments for various diseases on formulary based and develop protocols on restrictive usage of medications
8. Prepares and develop clinical decision tools which include order sets, dosing protocols, and order entry alerts
9. Advanced drug information education and training are provided to pharmacy students, international professionals, and residents
10. DIC practitioners actively participate in tremendous free services such as formulary support, database development, and training programs for clients

11. The information on therapeutic substances to health professionals is prepared and distributed as drug information bulletin materials and other media [25-31].
12. The DIC create a variety of educational resources for patients and health-care professionals in the form of pamphlets, newsletters about proper usage of medications effectively
13. Consistently helps in providing education services for health-care professionals
14. Participates in quality development research projects and drug cost analyses
15. Contributes to give peer review on research works and also on various biomedical literature works [32,33].

BENEFITS OF DRUG INFORMATION SERVICES

1. Promotes safe and effective usage of medicines by identifying the drug-related problems in the prescription
2. Minimizes the occurrence of drug-related issues to the patients by promoting good clinical care practices, thereby significantly contributes to alleviate the worldwide burden on misuse of drugs
3. Provides medication-use policies and contributes to processes them in resource development, thereby communicate this information to various health-care professionals
4. Reduces time consumption to the health-care practitioners in reviewing drug information by increasing pharmacists productivity
5. Improve patient compliance and patient safety, thereby ultimately leads to medication adherence
6. Improves drug cost management by reducing medication abuse
7. By utilizing drug information services increases provider and patient satisfaction [23]
8. The quality of patient care has been tremendously increased due to the services provided by DIC
9. Reduces the widespread practice of self-medication and drug interactions which is a consequence of various situations that reflect the growing number of drugs available in the market [34]

CLASSIFICATION OF DIC

It can be mainly classified into three types it includes:

Hospital based DIC

Some of the major activities performed by hospital-based DIC include receiving and answering the in-house call by the requestor, involved in formulary decision making and providing service education, participating in drug use evaluation, publishing newsletter, reporting ADR, assist in investigational drug activity, and Pharmacy and Therapeutic Committee [35,36].

Industry based DIC

DICs in the industry have access about all the detailed knowledge accumulated from the time of drug which was first developed, information about published literature, the knowledge of unpublished documentation, records of usage in unusual circumstances, and very important access to the relevant experts. Any user can communicate the company through phone calls at any peak hours; telephone recording machine is cleared every hour and the medical information staff can be contacted for any further information if required [37].

Community-based DIC

Community-based DIC aims to change patient behavior through drug therapy, improving patient adherence, thereby ultimately leads to quality health care. For any more further information about health, patients can actively seek consumer health information in response to their need. Using mobile technology through social media sites, patients are allowed to create their own content and share information about health on the internet [38].

INDIAN SCENARIO

In India, the view of DIC was first established in Tamil Nadu JSS Ootacamund, Maharashtra State Pharmacy Council,

Thiruvananthapuram Medical College Kerala, and Karnataka State Pharmacy Council. The WHO India Country Office, in collaboration with Karnataka State Pharmacy Council is supportive, in setting up five DIC to meet the needs of systematized drug information to health-care professionals and consumers. These centers have been established in Rajasthan (Jaipur), Goa (Panaji), Haryana (Sisra), Assam (Dibrugarh), and Chattisgarh (Raipur) [2].

In August 1997, Karnataka State Pharmacy Council established its DIC for the health-care professionals to disseminate unbiased drug information. In India, it was known to be the first independent DIC which is registered with IRDIS an International Register of Drug Information Services. A total of 15 DICs in India, which are known to be independent DIC, are providing clinical pharmacy services. Pharma Information Centre which is one of the independent centers provides information to drug manufacturers. The hospitals various at Chennai and Coimbatore also have a similar program [39].

Some of the independent DIC in India [40]:

- CDMU Documentation Center, Calcutta
- DIC, Maharashtra State Pharmacy Council, Maharashtra
- Andhra Pradesh State Pharmacy Council, Andhra Pradesh
- Karnataka State Pharmacy Council, Bengaluru, Karnataka
- JSS, Ooty
- Pharma Information Center, Tamil Nadu, Chennai.

Some of the hospital attached DIC were listed in Table 1.

CHALLENGES

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

1. The abundant factors that affect the efficient running of a DIC in developing countries are understaffing, outdated drug information sources, lack of recognition, ill-defined quality assurance programs, inappropriate facilities for working, and lack of clinical and managerial skills [41]
2. In resource-limited developing countries, the major hurdle in establishing a DIC comes in the form of the constraint of funds. Establishing and running DIC services successfully requires a good supply of recurring and non-recurring budgets [42]
3. 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 [43]
4. In addition to drug information, the DIC could also provide other value-added services such as poison information, ADR monitoring, and training of postgraduate students of concerned and allied disciplines to justify its budgetary requirements [44]
5. Providing quality drug-related information requires the employment of trained and experienced individuals in the DIC. However, there is a dearth of such individuals within academic hospitals
6. Introducing drug information residency/fellowships for the 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 [45]
7. To promote rational usage of drugs, the WHO recommends independent DIC, as a core component of national programs because one of the reasons for the failure of DICs is that their director has other responsibilities
8. For example, in many Latin American countries, DICs are located in pharmacy colleges and they are directed and run by a professor or HOD of the same. This could lead to the wrong approach. DICs should remain near to physicians, pharmacists, nurses, and other health-care professionals. They can deal better with the promotion of rational drug use
9. Quality assurance on the services provided by DIC should be monitor and compare with good standard resource regularly [46]
10. Frequently monitoring key processes such as number of queries answered per year, questions answered within 24 hours, user's satisfaction, publication of bulletin, participation in drugs committees, updating status of drug information sources, and continuing education by drug information specialists are challenges for drug information practitioners
11. The National Prescribing Service, which is an independent, government-funded organization in Australia, provides toll-free telephone service for primary care practitioners and consumers to promote the quality of medicines for patient care and consumer education. A psychotropic drug advisory service is also available. It was then, the DICs broadened their scope with more sophisticated activities in other countries which contributes to one of the major challenges in India [47]
12. By the end of 1973, the first formal survey identified 54 DICs in the USA. According to a report published in 1995, there are about 120 full-fledged pharmacists operated DICs, where the scope of DIC services is expanding, which serves as one of the main challenges to India
13. Maintaining ethical issues is one of the major challenges in running DIC. While responding to a query, the drug information practitioner should take several ethical issues into consideration. Some of the ethical issues need to be taken into account are while answering queries: Professional ethics must be maintained, patient privacy must be protected, the relationship between patient and physician should not be breached [48]
14. To assess the functioning of DIC, it is essential to perform the quality assurance program periodically. Quality assurance in DIC decides what services are to be provided, measuring how well the services were provided, and if the services were not found to be optimal or acceptable, undertaking some correctional activities to ensure future services to acceptable. In developing countries like India, there are only a few DICs and are limited by a lack of trained staff, funds, and

Table 1: Hospital attached drug information services with clinical pharmacy services

S.No	Hospital name	Place
1	Christian Medical College Hospital	Vellore, Tamil Nadu
2	Drug information center (Karnataka State Pharmacy Council) Bowring and Lady Curzon Hospital	Bengaluru, Karnataka
3	Department of Pharmacy Practice, National Institute of Pharmaceutical Education and Research	Chandigarh
4	Jawaharlal Nehru Medical Hospital	Belgaum, Karnataka
5	JSS	Mysore, Karnataka
6	JSS	Ooty, Tamil Nadu
7	N.R.S Medical Hospital	Calcutta, West Bengal
8	Kempegowda Institute of Medical Sciences	Bengaluru, Karnataka
9	Kasturba medical college	Manipal, Karnataka
10	Poison Information Centre	AIIMS, Delhi
11	Poison Information Centre, National Institute of Occupational Health	Ahmedabad, Gujarat
12	Department of toxicology, Amrita Institute Medical Science and Research	Cochin, Kerala
13	Toxicology and IMCU Unit, Government General Hospital	Chennai, Tamil Nadu
14	Sri Ramakrishna Mission Hospital	Coimbatore, Tamil Nadu
15	Trivandrum medical college,	Trivandrum, Kerala

limited access to current literature. This signifies that there is a need for periodic evaluation on the mode of functioning and quality of services that are being provided by DIC

15. To optimize the drug therapy outcomes and to get zero-defect in medication error, drug information center acts as a fine-tuning channel. Therefore, cooperation and competence among all the pharmacists and health-care professionals are essential for running a successful DIC. Pharmacists undergoing drug information services should possess a strong commitment and dedication to the service offered by leadership.

FUTURE PROSPECTS AND RECOMMENDATIONS

Although DICs have existed since the 1960s, their full potential has not been explored, especially in developing countries. If the above challenges which are mentioned are appropriately addressed, the future growth of DICs will become more productive and refined. 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. In India, DICs within academic centers can collaborate with the existing in-house department of complementary and alternative medicines Ayurvedic, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH) to provide such information.

Novel initiatives such as providing therapeutic drug monitoring service, adverse drug monitoring, and collaboration with forensic scientists for the 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 [49]. 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 an Indian setting [3,29,50].

CONCLUSION

The DIC practitioners in collaboration with health-care professionals in hospitals contribute to ensure safe and effective use of medicines. Therapeutic failure is one of the major burdens in the health-care system which is due to a lack of available updated information about drugs to the health-care practitioners. To overcome this, drug information practitioners should be well trained, especially in clinical training, to provide high-quality drug information services. However, pharmacists should provide accurate, well-referenced, critically evaluated, current, and unbiased information to health-care professionals. Private and government health-care systems along should step forward to organize more number of DIC to provide high-quality patient care. Besides, more awareness programs should be held frequently in various health-care organizations to promote and encourage the full utilization of drug information services.

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AUTHORS' CONTRIBUTIONS

Authors Thireesha and Mounika contributed to the collection of articles and preparing the draft; Pramod kumar and Sri Harsha contributed to editing and formatting the content.

CONFLICTS OF INTEREST

The authors declared that they have no conflicts of interest.

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