Revolutionizing Healthcare in India: Impact of Clinical Pharmacists in Enhancing Patient Outcomes

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ABSTRACT

During the past few years, the pharmacy profession has expanded significantly in delivering professional services and plays an integral role in the multidisciplinary provision of health care. The traditional role of pharmacists is expanding and now pharmacists are playing a role as a vital team member in the direct care of patients. Over the past few years, the clinical pharmacy has expanded its professional services significantly, leading to the introduction of the Doctor of Pharmacy study program. The aim of this paper is to highlight the role of clinical pharmacists in various departments. Clinical pharmacists are professionals with specialized training that offer complete drug management and direct patient care. The role of clinical pharmacists involves ward round participation, medical review of patient data, minimizing drug interactions and adverse events and patient counselling, thus enhancing the patient safety. The clinical pharmacists are mainly responsible for the Pharmacy and Therapeutics committee and Antibiotic stewardship program of hospital. Thus, in collaboration with doctors, nurses, and pharmacists, clinical pharmacists improve patient outcomes.

Keywords: Clinical Pharmacist, Doctor of Pharmacy, Pharmacy Practice, Clinical Pharmacy Services, India.

INTRODUCTION

Pharmacists represent the third largest group of healthcare professionals globally and play a crucial role in connecting health science with fundamental scientific principles to guarantee the safe and efficient utilization of drugs.^{1,2} The requirement for pharmacists is on the rise due to the rapid expansion of the pharmaceutical sector in India and the growing needs of patients.³ Over time, pharmacists have been engaged in various dimensions of the industry including research and development, manufacturing and quality control, as well as sales and marketing. Additionally, pharmacists play essential roles in practical settings such as community and hospital pharmacy.⁴

The professional roles and responsibilities of pharmacists have undergone a significant transformation from a concentration on production and distribution to the provision of pharmaceutical care services.¹ The concept of pharmaceutical care, as articulated by Hepler and Strand in 1990, entails the responsible provision



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of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life.² This evolution in the pharmacist's role encompasses a shift from mere dispensing to the emphasis of pharmaceutical care, aiming to optimize the benefits and safety of medications. This shift has involved pharmacists collaborating with other healthcare professionals to enhance patient outcomes by improving drug therapy, leading to the integration of clinical pharmacy practices into the Indian healthcare system. Consequently, the introduction of the Doctor of Pharmacy (PharmD) program in 2008 in India has emphasized the clinical aspect of the pharmacy profession. Notably, hospitals in India have recently initiated clinical pharmacy and pharmaceutical care services, yielding positive results in patient outcomes.3,5 The clinical pharmacists have several roles and responsibilities in the hospital setup such as participation in ward rounds, medical history and clinical review, reporting of adverse events, patient counselling services and therapeutic management for the patient safety. The clinical pharmacists are also involved in several committees of hospital such as Pharmacy and Therapeutics Committee, Infection Control Committee, Quality improvement committee and plays a major role in Antibiotic Stewardship Program of the hospital. The detailed roles and responsibilities are outlined further in the article.

ROLE OF CLINICAL PHARMACIST

The role of clinical pharmacist in healthcare system is depicted in Figure 1.

Clinical pharmacist in collaboration with other healthcare professionals improves patient safety and therapeutic outcomes.

Participation in Ward Rounds

A clinical pharmacist, in collaboration with a multidisciplinary team of physician, is required to participate in patient ward rounds daily. The inclusion of clinical pharmacists in ward rounds improves health outcomes by optimizing treatment regimen and quality of patient care. The clinical pharmacists' in-depth understanding of patient's history and clinical progress ensures rational use of drugs. Several studies observed that after active participation of clinical pharmacist, there was significant reduction in rate of prescription errors, adverse drug events, length of hospitalization and readmission.⁶⁷

Medication History Review

Clinical pharmacists conduct a comprehensive assessment of both prescribed and over-the-counter medications to ascertain a patient's complete drug utilization history and potential overuse. This process aids in determining the most suitable treatment regimen and ensures proper understanding of patient's allergies to prevent adverse drug reactions hence, reducing the risk of medication errors.^{8,9}

Clinical Review

Clinical pharmacists are involved in patient care through clinical review. They evaluate the daily progress of patients to ensure that the treatment regimen is appropriate, including the correct drug, dosage, duration of therapy, dispensing, and patient compliance. Additionally, they are involved in tailoring personalized therapy regimen by dose adjustment based on interpretation of blood and biochemical investigations. They are also involved in identification, assessing, reporting and root-cause analysis of drug related problems.¹⁰

The clinical pharmacist conducts inpatient and outpatient prescription audits to assess the safe and rational prescribing of medications. The audit encompasses assessing the legibility of written orders, appropriateness of the drug, dosage, frequency, and route of administration, documented allergies, uniform location of treatment orders, and identification of therapeutic duplication, potential drug interactions, and any instances of medication errors. High risk medications carry a potential risk for adverse outcomes as they are controlled substances, psychotherapeutic medications, concentrated electrolytes, and look-alike and sound-alike medications having narrow therapeutic index. Therefore, clinical pharmacist can ensure accuracy of the dose, frequency, and route of administration by verifying high risk medications.¹¹ Thus, inclusion of clinical pharmacist in healthcare system has resulted in significant reduction in medication errors and improvement in patient care.^{10,12,13}

Pharmacovigilance Activities

According to WHO (World Health Organization), an Adverse Drug Reaction (ADR) is defined as a response which is noxious and unintended, and which occurs at doses normally used in humans for the prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function. Indian Medical Association reported that the deaths due to adverse drug reactions are 400,000 and due to adverse events are 720,000 in India and the incidence of serious ADR is 6.7% and fatal ADR is 0.32%. Adverse events prolong hospital stay by approximately 2 days.14 Therefore, reporting of ADRs is essential for enhancing patient safety and outcomes. The clinical pharmacist performs identification, monitoring and reporting of ADRs in the hospital setting. The ADRs can be identified through ward rounds with consultants and by reviewing progress notes and laboratory parameters of each patient daily. The clinical pharmacist performs the causality assessment using WHO-UMC scale or Naranjo algorithm and classifies the ADR as certain, probable, possible or likely. The ADR form of Pharmacovigilance Program of India (PvPI) is filled by the clinical pharmacist and is then submitted to ADR Monitoring Centres (AMCs). After submission of ADRs, the clinical pharmacist is also responsible to solve the queries generated by AMCs or PvPI. Several studies show that inclusion of clinical pharmacist in the healthcare system has increased reporting of ADRs significantly and reduced the rate of serious ADRs.15-18

Prevention, Assessment and Management of Drug Interactions

The incidence of drug interactions in patients having multiple medications to treat comorbid conditions is significantly high which are responsible for Adverse Drug Events (ADE). Majority of ADEs are resulted due to Drug-Drug Interactions (DDIs). DDIs are changes in drug efficacy and toxicity due to concomitant administration of other drugs. There are increased chances of drug and food interactions in hospitalized patients due to polypharmacy.¹⁹ Drug interactions are caused by pharmacokinetics and pharmacodynamics mechanism which alters the efficacy and safety of the drug and ultimately results in undesired effects of drugs.²⁰ The prevalence of drug interaction was found to be 23% to 86% in developing countries.²¹ A study conducted by Louis et al., observed that exposure to contraindicated concomitant use of interacting drugs increases the risk of hospitalizations by 2.5 times.²² The clinical pharmacist, drug safety experts, checks the prescribed treatment and detects drug interactions which reduces drug related problems and improve drug therapy outcomes.²³⁻²⁶ IBM Micromedex, Drugs. com, Medscape and Lexicomp database are online drug reference systems used by clinical pharmacists for identification, knowing mechanism and management of potential drug interactions as contraindicated, major/severe, moderate or minor. The contraindicated and major drug interactions are informed to the consultants and then therapy modifications are made accordingly to achieve better outcomes of prescribed regimen.

Patient Counselling Services

Clinical pharmacists with extensive medication knowledge play an important role in patient counselling. They provide detailed and relevant information regarding prescribed medications purpose, dosage, route of administration and duration of therapy.^{27,28} Effective patient counselling can ensure medication adherence and improve clinical outcomes by increasing patients understanding and management of disease conditions.²⁹⁻³¹ Additionally, clinical pharmacist can improve patient care by decreasing medication errors and minimizing ADEs. Similarly providing education and counselling of discharge medication regarding safety profile of the drug can ensure timely administration of medications. Also, counselling patients regarding ADEs and follow up of the same has reduced rates of hospitalizations due to ADE.³² The counselling of patients regarding non-pharmacological measures such as exercise, diet, alcohol and smoking can improve disease outcome of quality of life.33,34 The patients are educated about proper administration of drugs such as insulin injection and the appropriate use of medical devices such as glucometer, digital BP machine, pulse oximeter and inhaler could result in better health outcomes.35 Thus, involvement of clinical pharmacist in patient counselling has improved clinical and economic outcomes and enhances health related quality of life of the patients.

Drug Information Services

Drug Information Centres (DICs) provides information about drug therapy and the drugs used in the healthcare system in response to queries received from various healthcare professionals, patients, organizations and public community either verbally or in written form. The drug information centres provide updated information on drug queries about drug dosing, adverse drug reactions, pharmacokinetic and pharmacodynamic parameters, therapeutic monitoring of drugs, alternative drug, drug interactions, drug overdose, information on new drugs available in the market, and many more queries. The WHO supports and encourages the development of independent DICs as a basic component of national healthcare programs to assure quality treatment and promote the rational use of medications. These services are provided accurately by the well-trained and registered clinical pharmacists which results in improved patient safety by providing optimal drug therapy, minimizing drug related issues and promoting rational use of drugs.³⁶ The purpose of offering properly researched, evidence-based recommendations to support particular pharmaceutical usage practices is to enhance patient outcomes and ensure prudent use

of literature resources. The clinical pharmacist uses American Society of Health-System Pharmacists (ASHP) policy and guidance documents and through professional judgements meets the needs of healthcare professionals and patients.³⁷ The clinical pharmacist uses primary (journals), secondary (indexes and abstracts) and tertiary (reference books) resources to give response to the queries. Dr. Sridevi *et al.* conducted a study to evaluate the quality of services provided by clinical pharmacists in DICs and found that the services provided were well accepted by healthcare professionals as through queries medication errors are identified and rectified.³⁸

Antibiotic Stewardship Program

Antimicrobial resistance poses a significant worldwide threat to public health. In 2019, 1.27 million of a total of 4.95 million deaths were attributed to antimicrobial resistance on a global scale.^{39,40} The inappropriate or excessive utilization of antimicrobials has contributed to the emergence of drug resistance. Therefore, antibiotic stewardship has been adopted widely to incorporate various measures to promote the responsible use of antibiotics, with the goal of preserving their future effectiveness and safeguarding public health. Antibiotic stewardship involves the systematic assessment and enhancement of the prescription of antibiotics by healthcare providers and their utilization by patients. The objectives of antibiotic stewardship embrace two main purposes: to guarantee effective treatment for patients with microbial infections and to minimize the unnecessary usage of antibiotics.⁴¹ These programs are beneficial in reducing treatment failures, decreasing health-care associated infections and also reducing antibiotic resistance, while proving economically beneficial to the hospital. The clinical pharmacist places an important role in antibiotic stewardship program of the hospital.

Several antibiotics which have higher tendency of ADRs and narrow therapeutic index are classified as restricted and reserved antibiotics. When a restricted antimicrobial is prescribed by the consultant, its dose, route, frequency, allergy, and culture and sensitivity report is checked by clinical pharmacist. The justification for prescribing these antibiotics will be taken from consultant. It is further reviewed and discussed with the microbiologist. The analysed data is discussed in the antimicrobial stewardship committee. Several research studies have proven that the addition of clinical pharmacists in the antimicrobial stewardship program reduced days of therapy for antimicrobial treatment and thereby improved patient outcomes.^{42,43}

Involvement in P&T and other Hospital Committees

The clinical pharmacist is involved in several committees of hospital such as Pharmacy and Therapeutic Committee (P&T committee), Hospital Infection Control Committee and Quality Improvement Committee. The clinical pharmacist acts as a member secretary and plays a very crucial role in P&T committee.^{44,45} The P&T committee is a medical staff committee responsible for managing the hospital formulary and to ensure appropriate medication usage in the hospital.⁴⁶

The roles and responsibilities of clinical pharmacist in P&T committee are enlisted below:

- Evaluates medication use and develops medication management process review for ensuring medication safety and efficacy.
- Reviews and advices on pharmacy inventory management by developing, approving and revising Hospital formulary. Additionally, also reviews drugs out of formulary and local purchase data.
- Reviews the quality and safety indicators pertaining to medications.
- They conduct literature review to update medication management processes which includes information on rational use of drugs, medication errors, management of ADRs and patient safety especially for high-risk drugs.
- Any other agenda related to medication usage and inventory management is discussed in the committee.
- The roles of clinical pharmacist in Hospital Infection Control Committee and quality improvement committee are:
- Reviews the antibiotic consumption and implement antimicrobial usage policy and review the variations and bring the same in to the notice of concerned clinicians.
- Develops and approves the Hospital Antibiotic Policy.
- Review the usage of surgical prophylactic antibiotics and take Corrective Actions and Preventive Actions (CAPA) for the noncompliance.
- Leads and provides education on the Antibiotic Stewardship Programme of the hospital.

All the medication related quality indicators provided regularly to quality head and the clinical pharmacist represent data in committee.

Training and Education

The clinical pharmacist is involved in educating healthcare professionals such as medical officers, nurses, and pharmacist regarding types of medication errors in order to ensure safe and timely administration of medicines and creates awareness about error-prone abbreviations to minimize the risk of medication errors. Awareness on antibiotic resistance and stewardship. In addition to this, they also provide education on antibiotic resistance and stewardship to ensure rational use of antibiotics. They also provide guidance on the recall of pharmaceutical products in cases of deficiencies in quality, safety, or efficacy, as well as on labelling, the importance of hospital formulary, high-risk medication, drug interactions, verbal order policy, and the shortage and dispensing of narcotic drugs.

Challenges Faced By Clinical Pharmacist

The role of clinical pharmacists in care of hospitalized patients has evolved over time with increased emphasis on safe and effective use of medicines and better patient care. India's clinical pharmacists encounter a number of difficulties. Healthcare professionals and the general public have very little knowledge of the hospital's clinical pharmacy services. As a result, clinical pharmacists and their significance to the healthcare system are not well acknowledged. Physician resistance is a major obstacle that prevents clinical pharmacists from collaborating with doctors for patient care.^{4,47} Despite having strong foundation for therapeutics, PharmD graduates are still underutilized in patient therapy management.⁴⁸

There is lack of government support towards clinical pharmacy services in hospital. The Congressional Comprehensive Health



Figure 1: Schematic representation of role of clinical pharmacist in healthcare system.

Manpower Training Act enhanced the importance and training of clinical pharmacists, which led to the development of clinical pharmacy in western nations. The absence of such an incentive prevents clinical pharmacists from advancing further in India.⁴⁹ Furthermore, the number of government colleges in India that provide PharmD programs and are connected to government hospitals is quite low. There are extremely few government institutions that offer clinical pharmacist positions; private hospitals have off lately initiated and offered such roles.⁵⁰ Due to lack of job opportunities in clinical pharmacy, the PharmD graduates are forced to engage in non-core fields such as clinical research, medical coding, medical writing, etc.⁴⁹

CONCLUSION

The clinical pharmacists are a major support in the Indian healthcare system as they uplift the standards of pharmacy practice. There is a need to interlink pharmacy institutions, practice and regulations. In developed nations, clinical pharmacists are involved in immunization campaigns and have expanded their roles to various departments such as cardiovascular, outpatient, emergency, infectious diseases and intensive care units. Collaborative efforts between general practitioners and pharmacists should continue to develop to address the medication management and healthcare needs of the community, both now and in the future.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ADE: Adverse Drug Events; **ADR:** Adverse Drug Reaction; **AMC:** ADR monitoring centres; **ASHP:** American Society of Health-System Pharmacists; **CAPA:** Corrective Actions and Preventive Actions; **DDI:** Drug-Drug Interactions; **DIC:** Drug Information Centres; **PharmD:** Doctor of Pharmacy; **P&T Committee:** Pharmacy and Therapeutics Committee; **PvPI:** Pharmacovigilance Program of India; **WHO:** World Health Organization.

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