



## A REVIEW ON CLINICAL PHARMACY SERVICES IN INDIA

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### ABSTRACT

Clinical pharmacy is a fitness care carrier in which pharmacists supply affected person care that develops medicine remedy and cares health, and sickness prevention. The medical pharmacy exercise embraces the values of pharmaceutical care, with specialised therapeutic qualification, experience, and conclusion to affirm most useful affected person outcomes. In India, the medical pharmacy has seemed as one of the trendy fitness care disciplines of pharmacy in the twenty first century. This new occupation in India extends its diversions in reporting ADRs/ADEs, supplying terrific drug information, dose calculations, affected person records review, affected person counselling and on the entire to a precise promising element of affected person healthcare service. Clinical pharmacists work immediately with physicians, different fitness professionals, and sufferers to verify that the medicinal drugs prescribed for sufferers grant the fantastic viable fitness outcomes. Clinical pharmacists practice in fitness care places the place they have everyday and non-stop interactions with medical doctors and different fitness professionals, contributing to higher coordination of care. When in contrast to western countries, India is underdeveloped in the utilization of medical pharmacists. India as the 2nd greatest populace u. s. wants to center of attention extra on enhancing its fitness care system. The Indian government ought to take a step ahead to begin scientific pharmacist posts in each hospital-like western countries. The cooperative attitude of the medical practitioner in the western nations closer to medical pharmacists need to be inculcated with the aid of Indian fitness care professionals. The goal of the learn about is to apprehend the limitations to the improvement of medical pharmacy offerings in India.

**Keywords:** Clinical pharmacy, pharmacy practice, India, Pharm D, current scenario, western countries.

### 1. INTRODUCTION

Clinical pharmacy service is an critical elements of the healthcare system. Advanced understanding and capabilities limited to medication and medicine- related things are the pre-requisite to put up pharmacy practitioners in a scientific team. Moran et al. diagnosed their position in optimizing remedy with not pricey strategies and their contribution towards facilitating antibiotic scrutiny, and teaching physicians, nurses and different healthcare providers[1]. Moreover, the pharmacy authorities of France employed scientific Pharmacists to handle the shortage of essential drugs such as aesthetics and excessive alert remedy throughout the pandemic. Their effectivity in deciding on the suitable substituent, increased their role all through the COVID 19 era[2, 3]. A collaborative scientific group incorporating the scientific pharmacists would grant higher affected person care and remedy outcome[4]. The entry of pharmacy exercise Self-discipline to healthcare demonstrated improved first-class and protected administration of medicines. Physicians were pleased with the effort put in by way of the scientific pharmacist. Sensitive streams such as oncology, nephrology, and cardiology considerably benefited from their intervention[5]. Despite that, even though humans are the beneficiaries, they are much less conscious of the contribution of pharmacy practitioners in the hospital and neighborhood settings[6]. Our society is very plenty cautious about their health, and their apprehension upward shove when they are supplied a therapy of their disease. This would on the whole temperature them for a 2d scientific opinion. Dingfield and kayser endorsed an superior care planning machine that would assist patients in understanding extra about their analysis and prognosis and enable friendly discussions with their clinical specialist on the feasible outcomes and goals. This device has cozy and reverted these beneath treatment from anticipations. Despite that, there are severa communities in India with restrained get right of entry to healthcare. George et al. noted that the lack of clinical amenities in far off areas had imposed a demand for implementing techniques to counter this state of affairs and set up standard health coverages to all in need. Moreover, bodily accessibility barriers, economic constraints, and social tumbling blocks are the different prevailing factors that avert many from directing themselves to deal with. COVID 19 had set fourth a new online generation and web-base services unfurling during India[7]. However this tempo is now not found in the fitness and scientific discipline. Even though novel medicinal drug dispensing structures are sprouting, it's utilization can be affected via the unawareness and unavailability of prescribed or required drugs, and social stigmas. In the U. S., an records technology-based pharmaceutical organization used to be prosecuted for counterfeit medications[8]. The situation is extreme in India, the place a variety of drug security problems are raised through posted articles. Nevertheless, e-pharmacy offerings are growing round cities and towns. In this context, every pharmacy practitioner ought to work hand in hand with drug inspectors of that locality to make certain rational utilization of medications.

**AN EVALUATION ON CURRENTLY AVAILABLE ONLINE PLATFORMS:****A) For healthcare professionals**

The cutting-edge scientific offerings provide many paid as nicely as free-to-use medication records web sites and cellular applications. Among them, healthcare authorities make use of Wolters Kluwer's UpToDate, Lexicomp, Micromedex etc., that serves up to date information on several medicines and ailments associated topics. These assets have complete and authentic facts structured and designed in readable format<sup>[9]</sup>. However, the current state of affairs had directed human beings toward very concise and to-the point statistics that without difficulty received acceptance. Healthcare flow needs quicker responses, and they additionally kind for such summarized information<sup>[9, 10]</sup>.

**B) For people**

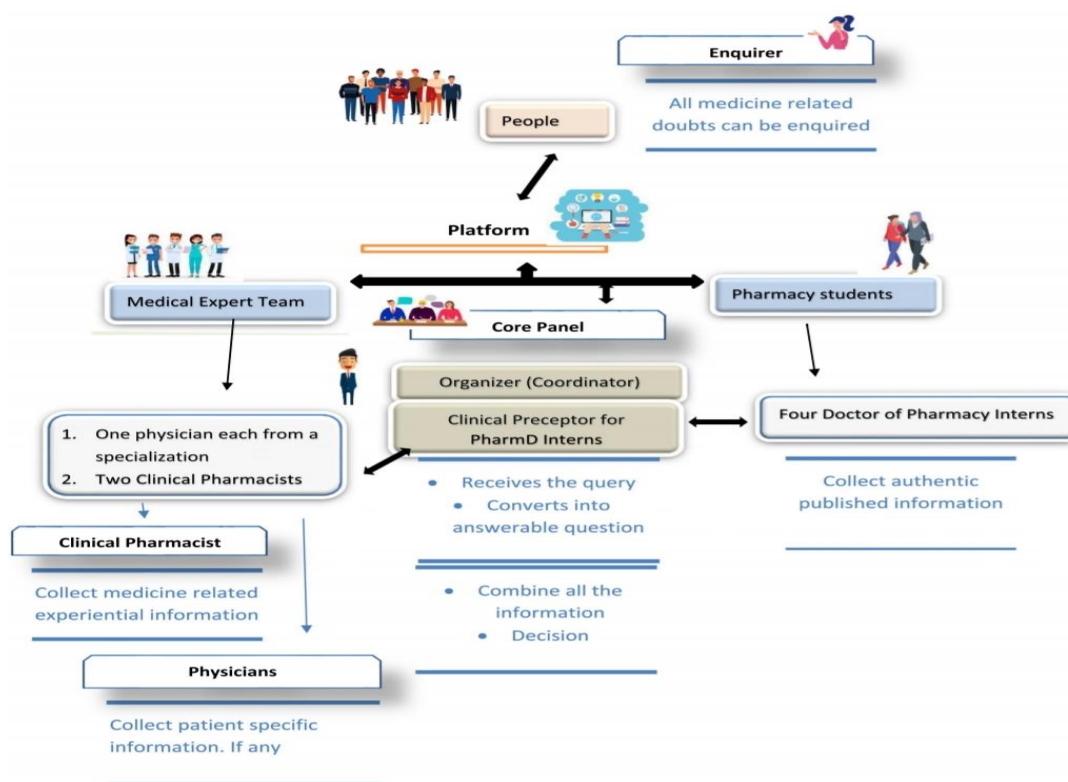
The reputed remedy reference equipment are payable to subscribe and has settings limited accessibility for the people. Moreover, pharmacists in each community and sanatorium settings disparate with workload and few postings in clinical pharmacy self-discipline has diminished pharmaceutical care and counseling amenities for people<sup>[11]</sup>. In these circumstances, Koster et al. recommended the implementation of tele-pharmacy services. Epic, Allscripts, CureMD, eClinicalWorks, and Cerner are some of the well known digital fitness archives structures that supply affected person service portals<sup>[12]</sup>. People are looking out for the pleasant healthcare facilities, and multiple opinions would confuse them on what to choose. Establishing a patient portal gadget would be greater challenging, factored through social stigmas. However, convincing the public would be convenient if a new medical service is free of cost. Hence, to supply real facts and opinions on medicines, we had put ahead a new device in the medical pharmacy decision.

**BENIGN STAGE OF DEVELOPMENT OF THE NEW VIRTUAL PLATFORM:****A) Formation of an expert panel**

A digital platform for scientific pharmacy offerings is new to Indians. It is difficult to predict the acceptance of the carrier deployed in on-line mode, and this catch situation has to be solved. As a study pillar, we formulated a medical specialist crew and a set of pharmacy exercise college students (Doctor of Pharmacy Interns) and their medical preceptor to represent the digital clinical pharmacy core panel (Fig. 1). The scientific preceptor for the PharmD interns is the program's organizer and coordinator and will be assisted by means of 4 pharmacy exercise students posted in the hospital<sup>[13]</sup>. The scientific professional group includes of one physician from every branch and two medical pharmacists and the willingness letter declaring their cooperation for the application used to be documented. An inquirer can be a character who has any doubt limited to medicine. Questions requested through a appropriate platform is acquired through the organizer. This is then modified to answerable query and despatched to assigned students, medical pharmacists, and doctors specialised in that area. The students would surf thru posted articles in Scopus, Web of Science, Medline, or PubMed listed journals, and genuine scientific web-portal such as Wolters Kluwer's Up-to-date and put up their findings in document format alongside with references, lower back to the organizer<sup>[14]</sup>. Meanwhile, clinical pharmacists can share their view on the be counted and retrieve the patient's information from the hospital's digital scientific document for similarly investigations.

**B) A trail platform; the Whatsapp messenger**

WhatsApp is one of the broadly used social media platforms, and it would be effortless for humans of India to share their doubts via it. As soon as the software was once initiated, alongside with medicine-related queries, other administrative questions rushed in from these underneath therapy in the medical institution and others. Instead of no longer responding to such out-of-scope queries, we addressed them to create a bond with the inquirer<sup>[15]</sup>. We also highlighted the proper cause of the application earlier than ending up the conversation. Accordingly, the CUG variety of all the departments in the hospital was accumulated and these calls and messages now not associated to drugs were redirected to the involved discipline. Our application that was once finished thru WhatsApp messenger was evaluated for a month and there have been queries involved with paediatric (n = 10), adults (n = 87), and geriatrics (n = 40) population. Our team identified 21 drug-drug interactions and 93 detrimental drug reactions. The assigned college students gathered evidences constrained to the drug-related matters drug-related and used to be submitted to the coordinator. Further, the problems have been notified to the worried health practitioner and the medical pharmacist, the place they quickly rectified the problems with appropriate interventions. Meanwhile, all these who availed our offerings had been furnished remedy counseling via telephonic calls or textual content messages. Before the stop of the conversation, we collected their comments and the responses depicted that they had been satisfied with the new system. Moreover, many preferred the crew for starting up such a novel project. This introduced self assurance in the crew to set forth a separate platform that completely executes the medical pharmacy service through on-line mode. A separate telephone used to be dispensed with the aid of the pharmacy college related with the sanatorium and the medical preceptor (PharmD, Ph.D. in Clinical Pharmacy) used to be the custodian of the wide variety and the device<sup>[16]</sup>. The promotion wing of the medical institution assisted and furnished brochures to attract people in the direction of the provider and stamps with the contact quantity for printing on their patient's discharge summary.



#### ORIGIN OF A SEPARATE PLATFORM FOR CLINICAL PHARMACY SERVICE:

This platform obeys the identical working system cited in WhatsApp counseling. Moreover, a few additions and adjustments have been carried out to ultimately be the elements. It is a mobile-based scientific pharmacy provider designed to assist healthcare companies and frequent human beings for rational consumption of medicine. The utility was once designed for about 500USD and is free to use with no commercial embedded in it. Its easy consumer interface facilitates the whole population, specially the geriatric population, to effortlessly handle all of its features. The scientific pharmacy cell utility is handy in Android Play Store that can be downloaded and hooked up in a device<sup>[17]</sup>. The user enrollment method is effortless, and sign-up requires minimal details such as name, profession, and cellphone number. A one-time password is generated to confirm the cellular number.

#### FEATURES OF THE CLINICAL PHARMACY MOBILE APPLICATION:

Following are services put forward by the application: -

##### **A) Visual medicine information**

The domestic web page of the utility shows multi-linguistic medication and health facts enabling all populace to view and recognize the content. We had in addition divided the data into these precise for the general populace and these for the elderly. Information constrained to chronic ailments are favoured for the geriatric section. The training and validation technique of the fitness records flyers are represented in Fig. two Upon thorough literature review, the coordinator/ organizer identifies the modern day theme of plausible pastime to the public. The students are divided into photograph editors and content material sorters and assigned the responsibility of creating the respective flyers. Upon completion, the visualized medication facts is validated through the organizer, pharmacy faculty, and the clinical specialist team. The references are then introduced and in the end posted through the Dr. MED<sup>[18]</sup>. Medical imaging offers integral visible records of indoors physique portions for the cause of medical investigation and restorative intercession which empowers docs for examining and treating an assortment of maladies. Content-based clinical visible facts retrieval (CBMVIR) or content-based clinical photo retrieval (CBMIR) is an lively laptop imaginative and prescient and clinical imaging lookup area. This is due to the consistent amplify in visible statistics manufacturing and the increasing assortment of restorative imaging information.

##### **B) Communication with inquirer**

The software has included a chat utility to have convenient communication with the inquirer. There are provisions to add pix and send voice and textual content commands. Moreover, weblinks can be shared, and the user would be re-directed to the web site upon a click. The organizer would cope with all queries and procedure accordingly. Being a trained expert in scientific pharmacy, the organizer does now not require to ahead the questions if he/she can him/her self reply them.

Fig. 2 represents the chat interface deployed via Dr. MED. The organizer and the inquirer can see when the message was once despatched and study the usage of the tick symbol at the backside of every message. The chat interface of Dr. MED is exclusively for medication and medicine-related queries, enabling the users to talk about the patient's cure or their doubt, not like WhatsApp messenger<sup>[19]</sup>. We additionally have delivered notification pop-ups in the Dr. MED user's phone that would useful resource them in no longer lacking out on any messages or notifications.

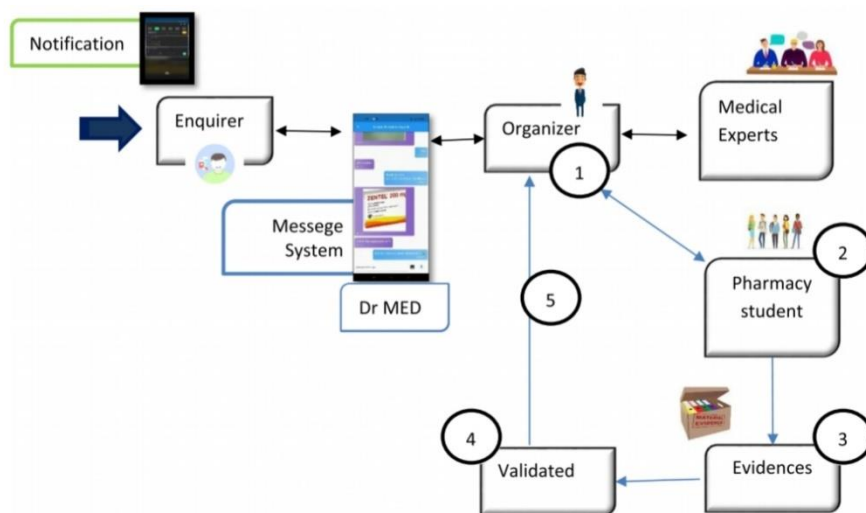


Fig. 2. The flowchart of the communication system

### C) Learning and education

Dr. MED presents its personal on-line clinical publications and remedy and health information videos to its clients. Those involved can register via the application and watch the pre-recorded sessions. The comments and other matters limited to the lessons can be mentioned with the organizer through the chat interface. Fig.4image the instruction flowchart of the videos. The organizer picks up few applicable matters concerning medicinal drug and fitness that fits the current scenario. This is then assigned to the pharmacy students, physicians, or scientific pharmacists upon their willingness. The video prepared by the assigned expert is screened for authenticity, and any faults in terms of deceptive statements, video quality, and bad reference supports are revised. The organizer then edits and posts it in the YouTube channel named Medicine Assist (A helping channel of Dr. MED)<sup>[20]</sup>. After sorting them into gorgeous sections, this would additionally be telecasted in Dr. MED application.

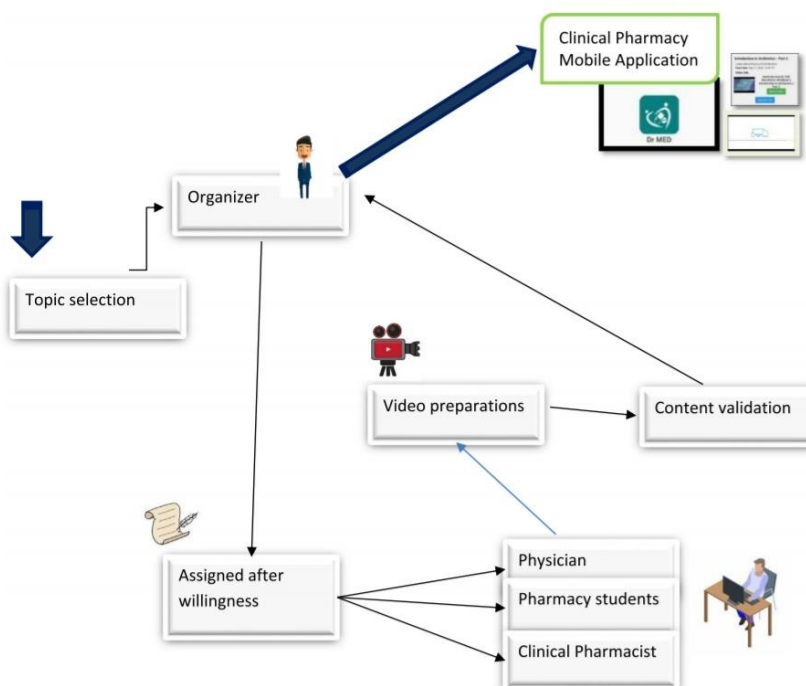
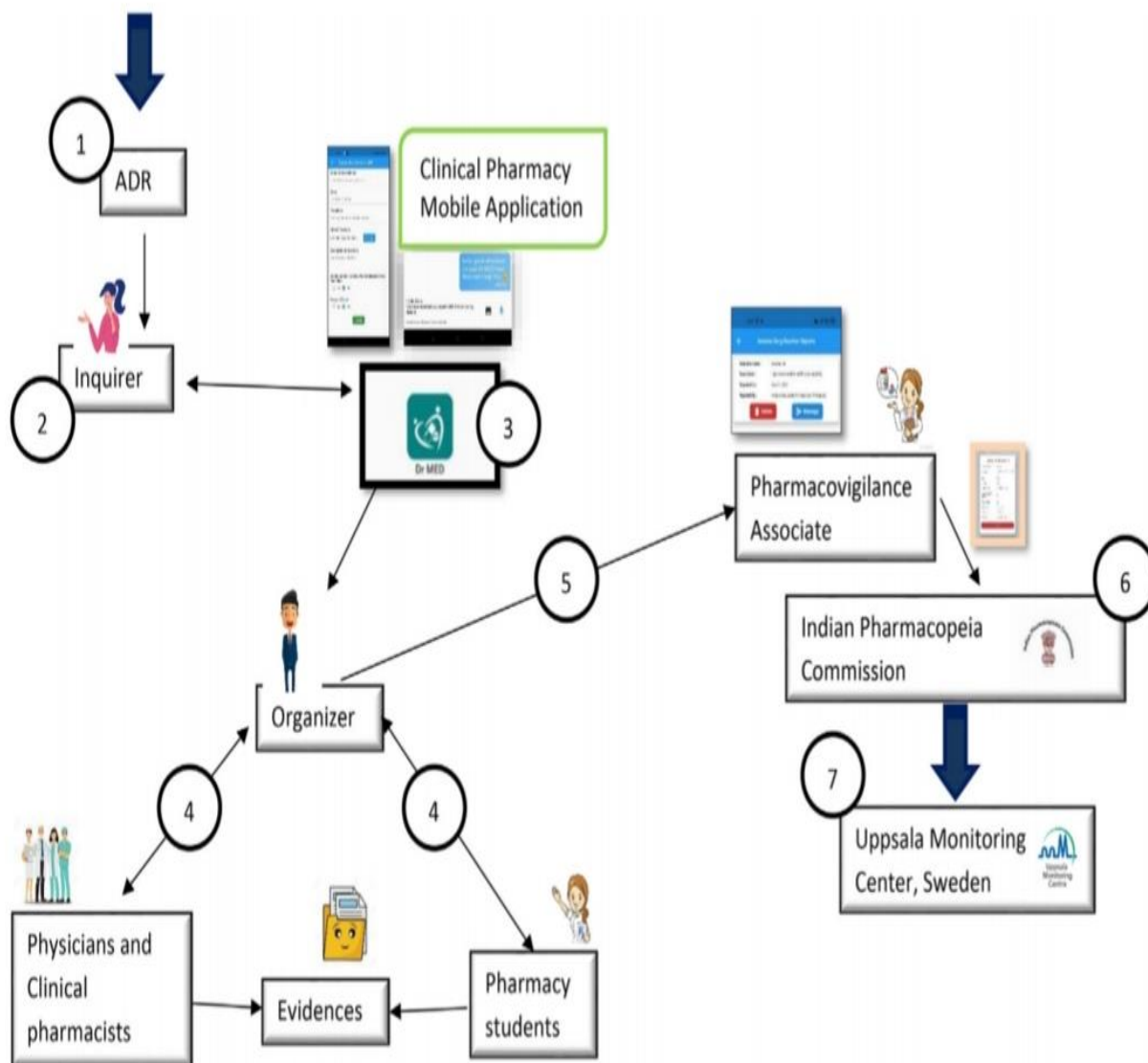


Fig. 3. The flowchart of the video preparation system for Dr. MED

**D) Adverse drug reaction monitoring system**

Adverse drug response (ADR) is any noxious match occurring due to the fact of medicine to any individual<sup>[20]</sup>. These activities can be quick or long-term and are introduced with various fatalities. A healthcare company wants to watch on such occurrences and file them to worried authorities. A clinical pharmacist or pharmacovigilance companion is the special medical expert skilled to detect, document and remedy an ADR. Students acquire proof with regards to the determined negative events from posted and real assets and a precise is submitted to the organizer. Moreover, scientific pharmacists' and physicians' opinions are additionally considered<sup>[21]</sup>. Once the tournament is tested via causality assessment, the file and important points are shared with the pharmacovigilance associate of the pharmacovigilance software of India (Fig.4).



[Fig. 4.The workflow of Dr. MED ADR reporting system]

**SERVICES PROVIDED TO COMMON PEOPLE:**

1. Clarification of medicine-related doubts
2. Modification of remedy in case of any discrepancy, in consultation with the physician
3. Identification and early detection of unfavourable drug reactions and recommendations to forestall fatality and re-occurrence of such events
4. Patient medicinal drug counseling on their today's and newly prescribed treatment
5. Medicine recognition and training application
6. Any therapeutic duplications due to the fact of poly-pharmacy
7. Recommendation and recommendations restrained to their treatment

8. Assessment of drug-drug interactions and drug-food interactions.

### **INCORPORATION OF VIRTUAL PLATFORM WITH ONLINE PHARMACIES:**

The subsequent section of our cell software is to be part of fingers with e-pharmacy portals. We can make sure genuine and general information are conveyed to human beings who acquire their drug treatments via couriers and untrained staffs. [22]

#### **A) Huddles faced during implementation**

We had to preserve a strategical strategy to ensure the solutions supplied do no longer harm their emotions and therapy adherence.

#### **B) Scope**

Implementing a digital medical pharmacy application in its superior form would allow human beings to be in contact with their pharmacists. Such a system can beautify the consciousness and viable contributions a pharmacy professional can impart in the direction of affected person care.

## **2. CONCLUSION**

The hospital pharmacy is indispensable in the treatment of patients. Each large hospital will need a pharmacy, with a well qualified pharmacist in charge. The COVID-19 pandemic has printed lacunae in the healthcare system, education, and education of PPs for EP&R in India. A systematic review of the population's wishes is wished to boost a PP EP&R framework to allow high quality responses in emergencies. Formalizing such EP&R responses via education, training, and lookup would further serve to amplify PPs roles and consciousness as healthcare professionals in India. The medical pharmacy services to the society is expecting reforms. This evolution, even though slow, requires massive efforts and steady awareness to the public. The improvement of a virtual platform for practicing pharmacy would achieve more acceptance thinking about the encroachment of electronic and information technological know-how even to rural communities. Clinical pharmacists and the pharmacy faculty joined palms with other healthcare providers collaboratively would outline the program's success. Nevertheless, students should deal with real-time practices and their want to contribute to society's health would improve them to be trained pharmacy profession in the future.

## **3. FUTURE ASPECTS**

Increased populace in India has resulted in the scarcity of Healthcare professionals. Moreover, most of the populace belongs to under poverty line or both low profits team and as a consequence cannot come up with the money for the extended fee of scientific aid. In India, Pharmacists do now not provide any expert offerings like counseling, direction of medicinal drug use, opportunity of detrimental drug reaction, feasible drug interplay when a couple of drugs are cautioned etc. Also, the curriculum, terrible clinical knowledge, lack of medical coaching etc. can't enable the pharmacists to go past the primary function they are presented and as such Clinical Pharmacy Practice has end up the want of hour. Clinical pharmacy practices motivate the shift of single focal point from product orientation to a couple of engagements and maximize the advantages that a affected person can gain from the consumption of drugs and as such medical pharmacist's helps to promote healthcare amenities and prevention of sickness via optimization of the medicinal drug via thereby play direct function in affected person. Government has now shifted its center of attention and the change is reflected in the modified curriculum in pharmacy education and additionally with the start of a range of courses with emphasis on clinical/medical exercise like Doctor of Pharmacy, Postgraduate Programs in Pharmacy Practice during the modern decade. The focus ought to be on applied therapeutics, affected person data analysis, patho-physiological basis of disease, scientific pharmacokinetics as well as communication abilities as per local needs. The most essential part of this would be health facility based education whereby the concerned trainees would have a clear apprehend of all the aspects of the therapy which includes diagnostic process, lab testing and information analysis, mode and role of different cure methods and options, consequences of drugs etc. The thinking seems to be very accurate and benefitting but is nonetheless in its infancy and it will still want a decade to flourish as mitigation of all aspects of pharmaceutical care into fitness system will take time as adjustments right from backside which includes modifications in curriculum, addition of new and upgraded courses in relation to pharmacy practice during the country alongside with changes in mode of training and clinical/hospital primarily based training or internship, advent of posts and infrastructure with inputs from government and stake holders is required. Since Independence till 2010, education (curriculum) as well as pharmacist's role and practice was more oriented towards pharmaceutical industry needs viz. production, formulation, quality control and marketing rather than practicing and management in the health sector with the consequence that India lacked in the healthcare facilities. It resulted in improper treatment, ADR (adverse drug reactions), medical treatment getting out of reach of common man leading to economic loss to patients and finally misuse of drugs leading to drug abuse ultimately causing huge loss to Indian economy.

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