



THE ROLE OF CLINICAL PHARMACIST IN HEALTH CARE SYSTEM : A REVIEW

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ABSTRACT:

The objective of this article is to create awareness about clinical pharmacy service (CPS) and to introduce the role of clinical pharmacist (CPs). Clinical Pharmacist are going to be the major support to indian health care system in near future; the reasons being 1) CPS are beneficial in many ways to improve health care ; 2) CPS have already proved their importance in western countries. Various problems associated with drug use such as adverse drug reaction (ADRs) ,medication errors and adverse drug events (ADEs) are very common. ADEs can lead to drug related morbidity and mortality. Many studies show that from 7-30% of hospital admissions are directly related to drug treatments issues. Clinical Pharmacy has developed one of the latest branches of pharmacy. It is that specialization of pharmacy where in pharmacists deal with various aspects of patient care,dispensing of drugs and advising patients on the safe and rational use of drugs. In health care system, the services regarding clinical pharmacy are of considerable importance because the concerned clinical pharmacist serves as a guide to the physician for effective , safe and rational use of drugs. A clinical pharmacist also helps in achieving economy in the hospital by planning safe drug policies, suggestive means of reduction of cost, by preventing misuse or wastage of drugs. Hence, scope of clinical pharmacy covers areas to foster innovation, improve public health and provide a knowledge exchange. With this ever increasing role of clinical pharmacy practice, hospitals have started distinguishing the importance of clinical pharmacy. In this review article, we will briefly unfold the various aspects related to clinical pharmacy services in health care.

Keywords: clinical pharmacist , Master of pharmacy (pharmacy practice), Doctor of pharmacy (D pharm)

Introduction:

Clinical Pharmacy is the branch of pharmacy in which clinical pharmacists provide direct patient care that optimizes the use of medication and promotes health, wellness ,and disease prevention.(1) Clinical pharmacists care for patients in all health care settings but the clinical pharmacy movement initially began inside hospital and clinics. Clinical pharmacists often work in collaboration with physicians, physician assistants, nursepractitioners. And other healthcare professionals. Clinical pharmacists can enter into a formal collaborative practice agreement with another healthcare provider,generally one or more physicians that allow pharmacists to prescribe medications and order laboratory tests.

While pharmacists may participate in the management of specific medications or individual Disease states (e.g.diabetes,hypertension. (2) the goal for clinical pharmacists is a broader approach or comprehensive medication management (CMM). The definition of CMM is the standard of care that ensures each patients medications (prescription, non-prescription, supplements,or herbals) are individually assessed to determine if appropriate for the patients effective for the condition, safe for use with concurrent comorbidities and therapies, and that the patient is able to take them. An individualized care plan defines the goals, monitoring , and intended outcome. The patient is an active participant in a development of CMM plan, along with other member of care teams. Key elements of CMM will be described in the standards of practice section. The impact of CMM provided by clinical pharmacists in settings is under investigation with a goal to determine effective process and to measure overall patient outcomes. The disease –state specific medication therapy management programs have shown a reduction in frequency of some medication – related problems including nonadherence, and have lowered some healthcare costs(3)

Professional skills and ethics assure the optimal safety in the distribution and use of medicine the purpose of professional education in clinical pharmacy and public health is to qualify each pharamaconomist (expert in pharmaceuticals) to practice clinical pharmacy at higher more professional level .(4,5) Hence , ensures the patients maximum well-being during the drug therapy. Clinical pharmacy practice also deals with proper maintenance of the documentation regarding the medication incidents effectively to maximize the patients compliance in drug use process.(6)

The Role Of Clinical Pharmacist In Health Care System – A Review

Within the system of health care , clinical pharmacists are experts in the therapeutic use of medications. They routinely provide medication therapy evaluations and recommendations to patients and other health care professionals. Clinical pharmacists are a primary source of scientifically valid information and advice regarding the safe , appropriate and cost-effective use of medication (7)clinical pharmacists are making themselves available through a medication information hotline, and reviewing medication lists, all in an effort to prevent medication errors in foreseeable future. In the united kingdom, clinical pharmacists are routinely involved in direct care of patient within hospital, and increasingly,in doctors surgeries. To provide

expertise on the use of medicines to national organizations such as NICE, the Department of Health, and the MHRA, and develop medicines guidelines for use in therapeutic areas.

Clinical pharmacists interact directly with patients in several different ways. They use their knowledge of medications (including dosage, drug interactions, side effects, expense effectiveness, etc) to determine if a medication plan is appropriate for their patients. If it is not, the pharmacist will consult the primary physician ensure that the patients is on a proper medication plan (8) The pharmacist also works to educate their patients all the importance of taking and finishing their medication. Studies conducted into pharmacist – led chronic Disease Management show that it was associated with effects similar to usual care and might improve physiological goal attainment.(9)

Medical provider, and their scope of practice is constantly evolving. (10)(11) In the United Kingdom clinical pharmacists are given independent prescriptive authority. (12)

Basic components of clinical pharmacy practice include prescribing drugs, (13) administering drugs, monitoring prescriptions, managing drug use, and counseling patients.



Provision of drug and poison information

In normal life, various electronic databases and drug information software are used for provision of unbiased and latest medicine/poison information in the western world. Such software /databases give easy, quick and updated information about drugs /poisons. Some good examples include - MICROMEDEX™, clinical pharmacology™ (by Elsevier), Medscape™ etc. Further to add, their mobile and apps are also available for quick information related to medicine (14,15) There is much scope to use such drug information tools in Indian set-up. The tools can also be used to check drug interactions. The government authorities are advised to take initiative for providing such tools to educational institute and drug information centers.

Role Of Clinical Pharmacist In Medication History Interview

Interviewing a patient in collecting the data medical history is called medication history interview (36,37) The goal of medication history interview is to obtain information on aspects of drug use that may assist in overall care of patients (38) Accurate medication history of the patients is important to assess – the medical concordance, rationale for the drugs prescribed previously, patients understanding toward medicines, evidence for drug, abuse, patient acceptance for the treatment, documenting allergies and adverse drug reactions (ADRs), etc (16)

Role Of Clinical Pharmacist in Clinical Review

In clinical review, pharmacists have to check the drug therapy to ensure that the patient is getting the most appropriate dose, dosage form, duration of therapy for their medical / disease state, Also he has to correlate the signs and symptoms of the patient, laboratory results, medical diagnoses and therapeutic goals with the medication history for better patient care (16) According to Jain et al (17) study, medication errors are common even in neonatology, The CPs can play a significant role to solve such serious issues. The aim of clinical review

- 1) To assess the response to drug treatment
- 2) To evaluate the safety of the treatment regimen
- 3) To assess the progress of disease and the need for change in therapy
- 4) To assess the need of monitoring
- 5) To assess the convenience of therapy to improve compliance.

Role Of Clinical Pharmacist in Patient counseling

Patient counseling can be considered as the most important CPS from the patients points of view. The pharmacists may provide the information about current clinical condition / proceedings of the patients educate him about the safe and appropriate use of medicines, thereby enhancing his therapeutic outcomes⁽¹⁶⁾. Generally, there are many questions in patients mind about disease, drugs, lifestyle modification, diet, treatment, duration of therapy and medical devices, e.g. metered dose inhalers for asthma patients of insulin pen for diabetics. Here, the Pharmacists can educate the patients about all such areas as a part of CPS.

ACP may provide information all ongoing care to patient to ensure continuity of supply of drugs, continuity of medication concordance aids, communication of special problems, appropriate monitoring of the dosages and for minimal disruption⁽¹⁶⁾.

The Patient may be counseled / educated for the following points about the drugs by the pharmacists^(16,18)

- Generic name, brand name of the drug
- Dosage
- Indications/ benefits of the medicine and expected action.
- Proper storage
- How to take medication?
- When and How long to take medication?
- Information about ceased / new medication
- Special Precautions about the drug
- Common ADRs
- Action to be taken when a dose is missed
- Drugs and foods to be avoided

Benefits of patients counseling include patient satisfaction, prevention of medication errors, better clinical outcomes and psychological support to the patients. Patients education especially plays an important role in chronic disease^(19,20). The major problem in front of India include diabetes, hypertension, dyslipidemia, breast cancer etc and patient education/ counselling does matter in all such disease conditions.

Role Of Clinical Pharmacist in ward round participation

As a member of healthcare team, the pharmacists can attend ward round. The goals are improved understanding of patients history, progress, clinical details, to provide the information on clinical aspects of patients therapy and to improve discharge planning. The clinical pharmacists can also help in decision – making to select the quality low- cost medicine; optimize the quality of patient care clinical outcomes ensure medicine selection as per formulary and local guidelines.⁽¹⁶⁾

Role Of Clinical Pharmacist in Community pharmacy

Community Pharmacy services generally involve dispensing of drug, promotion of healthy lifestyles, support for self-care provision of practice leaflets to the patients, medicines use review, smoking / alcohol cessation programs etc, CPs can participate in various community service programs such as smoking cessation, alcohol consumption, health promotion, health nutrition, etc⁽²¹⁾. As community pharmacy services are not common in India or are being provided by other professionals, after implementing, it will be very much helpful for the common man of India.

Role Of Clinical Pharmacist in Research

Despite of being a highly populated country (ranking 2nd on the globe) with numerous hospitals, contribution of clinical epidemiological research by India is not remarkable in the world. For the current contribution, Indian physicians, nurses and other healthcare providers are playing more or less roles. As the concept clinical pharmacy is still in the initial stages of development, contribution of CPs toward the research is negligible at this point of time.

Meanwhile, qualities of CPs towards the research include presence of this work as a part of syllabus, enough exposure to hospital and knowledge of subject such as pharmacotherapeutics, clinical pharmacy, hospital pharmacy, clinical toxicology, biostatistics, research methodology, clinical pharmacokinetics, pharmacoconomics, etc⁽²²⁾ with the assistance of CPs physicians, nurses and other health care providers, India may come up with tremendous data published (which is now unpublished) and apart from this presence of CPs will open new research opportunities in the country for pharmacoconomics, clinical research, patient-reported outcomes, quality of life, pharmacovigilance, clinical pharmacokinetics etc.

Career prospectus and job opportunities for clinical pharmacists,

A PharmD person is eligible to work in all areas where a Bachelor of pharmacy (B.Pharm) qualified student can work. A part from this a CP (both PharmD and M Pharm pharmacy practice) can work in several other areas after completion of the course. Here, we are predicting the career prospectus and job opportunities of CPs according to the international scenario. Though all these areas are not well-established at present in India for CPs we believe that these areas would be open for them in near future.

Role Of Clinical Pharmacist in Hospital academics and Further Education

As a surgeon is known for surgery, a physician is known for diagnosis and treatment of a disease; a CP would be known / recognized for providing CPS in India, providing CPS is the first and foremost responsibility of a CP. CPs can work as a faculty member in an academic institute. They may also join a suitable teaching position in a diploma / Degree / Post Graduate pharmacy institute such as lecturer assistant professor, associate

professor, professor ,head of the department ,head of institution , principal or director with suitable experience ⁽²³⁾ At this point of time , numerous pharmD colleges are getting established in india , so both M.Pharm (pharmacy practice) and PharmD people have large job prospectus in academics as far as nonteaching hospital a considered , currently , some elite and US-based hospital in india are recruiting CPs. Practicing pharmacists are expected to be recruited by the government hospitals too in near future further more ,CPs may have role in hospital administration, team, pharmacy/therapeutic committees in hospital etc.

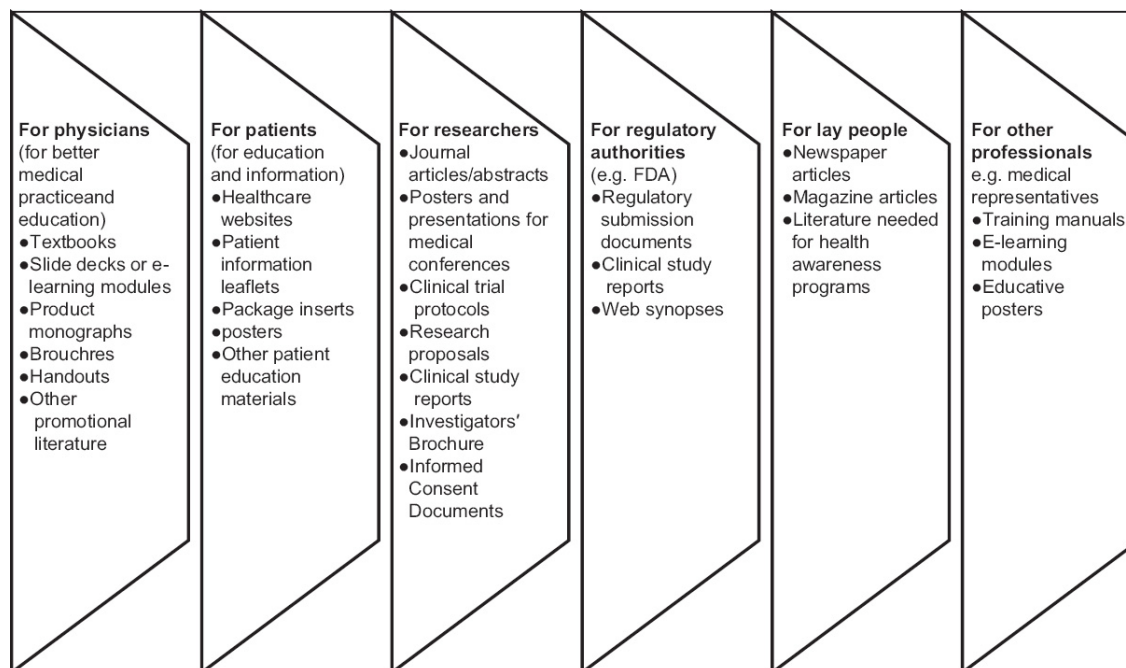
The Role Of Clinical Pharmacist in Higher Education

The person who has completed pharmD/M.pharm (pharmacy practice /clinical pharmacy) can register for PhD in India / abroad. After pharm D some western countries offer specialty programs such as oncology,pharmacotherapy, nuclear pharmacy, nutrition support ,psychiatry, ambulatory care, etc. Such specialty courses are not yet available in India but would be obtainable in new future.

Role Of Clinical Pharmacist in Medical Writing

This also known as “ scientific writing “, or “Medical communication “ Medical writing involves writing in different types of health care document for different purpose and for different audiences. Different types of medical literatures, their purposes and target audiences are mention in figure 1. The medical writers are required in pharmaceutical /healthcare companies, contract research organizations (CROs). Business process outsourcing /Knowledge process outsourcing companies (BPOs/KPOs) , healthcare communication companies ,media and publishing companies ,medical journals, medical societies , The skills needed to become a competent medical writer are : Domain knowledge , language and grammar skills, quick interpretation of medical data etc.⁽²⁴⁾ At present ,there are numerous CROs,BPOs,KPOs and pharmaceutical companies in India who are hiring medical wirters.

Figure : Types Of Medical Literature With Target Audiences.



Role Of Clinical Pharmacist in Medical Coding

Medical Coding (also known as medical classification) is nothing but transformation of descriptions of medical diagnoses and procedures into universally acceptable codes. The codes are used in a variety of fields such as medicine ,public health and medical informatics for statistical analysis,reimbursement schemes, etc⁽²⁵⁾ Currently, there are numerous medical coding companies in india

Role Of Clinical Pharmacist in Medical Billing.

Medical billing is different from medical coding. It is a process of translation of health care service into billing claim ⁽²⁶⁾ There are many health insurance companies in nation but to the best our knowledge ,recruitment of CPs is very much rare at present. However we project the role of CPs in medical billing as well.

Role Of Clinical Pharmacist in Medical Transcription

In simple language ,medical transcription is transcribing (typing) the doctors report from dictated audio files, In developed country, the health practitioner dictates what he has done after performing procedures on patient and the medical transcriptionist (MT) (also known as medical language specialist) transcribes the oral dictations and /or edits the report such patient specific health information is converted in written text document and maintained in printed E- version or kept in patient record files. Nowadays, speech recognition softwares are used for better practice of medical transcriptions ⁽²⁷⁾In current scenario, there are limited hospital in India recruiting MTs. Skills needed to become a MT include: sound knowledge

medical terminologies, disease conditions, anatomy, physiology, pharmacology; medical language and grammar; typing skills ; effective communication skills,etc.

Role Of Clinical Pharmacist in Pharmacovigilance

World Health Organizations defines pharmacovigilance as, “ the science and activities relating to the detections,assessment, understanding and prevention of adverse effect or any other drug related problem.”⁽²⁸⁾

Documentation,analysis and prevention of ADRs are needed for epidemiological studies and patient safety. Presently ,some hospital in India are recruiting people in pharmacovigilance, Various BPOs/KPOs In india are recruiting people for pharmacovigilance. Skills needed to work in the area of pharmacovigilance are: sound knowledge of pharmacology and ADRs, laboratory results, clinical research etc.

Role Of Clinical Pharmacist in Clinical research and drug development

Both these things are related to clinical trials. There are countless clinical research organizations present in the country. Clinical research coordination (CRCs) clinical research associate (CRAs) , research statisticians and higher positions (with optimum experience) are suitable posts for CPs in clinical research organizations. CPs can work as principal investigators ⁽²⁹⁾ and patient educators in clinical trails. Pharmacists can play a role in enhancing patients participation in clinical trial research ⁽³⁰⁾ Skills needed to work clinical research organization include knowledge of statistical, medical and pharmacologic terms, pharmacovigilance, sincerity in documentation, ability to travel extensively (especially for CRAs) etc.

Role Of Clinical Pharmacist in Forensic pharmacy

Forensic pharmacy is the field where there is application of drug – sciences to medico – legal issues. In western countries, a pharmacist can engage in legal cases related to malpractise. ADRs, drunk driving, drug abuse, healthcare fraudulence, poisoning, toxicity and various other types of civil and criminal cases ⁽³¹⁾ Though India has very few pharmacists working in these areas at this point of time, we believe that CPs will have future in these areas too.

Role Of Clinical Pharmacist in Medical / Clinical Science liaison

Medical science liaison (MSL) is a healthcare consulting professional, employed by pharmaceutical, biotechnology, medical device and managed care companies to provide unbiased (nonpromotional) information about the product. MSL ⁽³²⁾

- Ensures that products are utilized effectively
- Serves as scientific peers and resources within the medical community
- Serves as scientific experts to internal colleagues at companies.

The Professionals are also known as medical liaisons / medical science managers / regional medical scientists / regional medical advisors / directors, MSL is different form medical sales representative as shown in Table 2 ⁽³³⁾

	Medical sales representatives	Medical science liaison
Educational qualification	Varied educational background	PharmD, MD, PhD
During face to face interaction	Promote a particular product	Provide unbiased information of the product
Way to educate healthcare providers	Discuss the product's safety and efficacy issues as per the labels	Present scientific posters at various national/ international conferences
What do they provide?	Samples and patient education materials	Develop and provide continuing medical education programs
The way of working	Refer healthcare providers to MSL for the questions that could not be addressed using product labels	Train physicians/ pharmacists for late phase clinical studies

In India MSL is an evolving, highly paid field for CPs. Importance skills needed to become MSL include excellent communication and presentation skill, related therapeutic expertise, relationship building skills, ability to travel extensively, ability to train, etc⁽³⁴⁾

The Role Of Clinical Pharmacist in Contract research organizations

Contract research organization are an organization that provides support to the product device (pharmaceutical / biotechnology/medical) in the form of research services on contract basis CPs may get absorbed in CROs working in the following field -pharmacoeconomics,patient –reported outcomes, health technology assessment, literature review, systematic reviews, quality of life studies etc All these areas are new in India but such CROs do exit in the country. Skill needed to work in CRO is excellent analytical skill, through knowledge of therapeutics and statistics, excellent grasping

capacity, handling of databases (e.g , PubMed) etc.

The Role Of Clinical Pharmacist in Bioavailability /bioequivalence studies

In simple words, bioavailability (BA) is the fraction of the administered drug available in blood circulation while bioequivalence (BE) is the comparison of bioavailabilities of two pharmaceutical products with same drug and dosage. BA/BE studies are conducted for following important purposes (1)

development and determination of dose and dosage form of a drug (2) the quality control of drug products (3) development of new formulation of the existing drugs. The companies working in the area of BA/BE exist in India. To enter in the field of BA/BE studies, knowledge of pharmacotherapeutics, clinical pharmacokinetics and clinical research is necessary

The Role Of Clinical Pharmacist in public health, government sector and nongovernmental organization

Apart from community pharmacy, the clinical pharmacists do have a role in public health. The area and the role of clinical pharmacists are as follows⁽³⁵⁾

- Immunization programs: Administration and promotion of immunization
- Disaster preparedness and response, eg., natural disaster, Education of public, planning of emergency response surveillance of notifiable syndromic conditions, communication with public, provision of mass medications, etc
- Contraceptive services: Distribution of contraceptive measures and education about their use.
- Prevention and control of disease and injury: promotion of healthy lifestyle, reduce hospitalizations.

In government sector and nongovernmental organization CPs may have a role in policy framing, drug/poison information centers, health camps, awareness programs, pharmacovigilance center, patient counselling center, etc.

CONCLUSION:

Clinical pharmacy services can serve as an important contributing factor in the betterment of health care system. The participation of clinical pharmacists in discharge planning and advice to patients about their medicine could lead to the reduction of hospital re-admission. Pharmacists should be involved in training the technicians or nurses about the uses and administration of medication to patient in a proper effective manner, also pharmacists should directly be involved in patient discussion regarding the rational use of medicines. Encouraging patients to take medicine is an important objective for clinical pharmacy. The utilization of evidence based best practice could help in the improvement of patient outcomes. Pharmacists have a role as team members and as individual practitioners ensuring that patients benefit from their pharmaceutical care

Clinical pharmacists are definitely going to be the major support to the Indian healthcare system. Patients, physicians, other healthcare providers, hospitals and different industries will get a lot of benefits out of CPS

Benefits to the patient	Benefits to physicians, nurses and other healthcare providers	Benefits to the hospital as a whole	Benefits to industries
<ul style="list-style-type: none"> • Patients receiving Pharmaceutical Care • Patient counseling (regarding proper use of medicines, disease, lifestyle modifications and diet) • Psychological support to the patient • Prevention of drug abuse • Patient education for avoiding medication errors • Medication aids counseling 	<ul style="list-style-type: none"> • Getting unbiased drug and poison information • Reporting and assessment of Adverse drug Reactions (ADRs) • Determination and prevention of drug-drug, drug-food interactions • Drug therapy monitoring • Determination of drug incompatibilities • Prevention of medication errors 	<ul style="list-style-type: none"> • Better patient care • Better and new research opportunities and research assistance • Assistance in community services of the hospital 	<ul style="list-style-type: none"> • Industries may get knowledgeable and clinically advanced people for recruitment • Industries with new ideas in pharmacy practice may develop in India e.g. Pharmacoeconomics, Health technology assessment, contract research organizations etc.

REFERENCES:

1. American college of clinical pharmacy " The definition of clinical pharmacy" (PDF). Pharmacotherapy. (june 2008)
2. Thomas D book of Clinical pharmacy education, practice and research ISBN9780128142776 (November 2018).
3. M.Viswanathan, L.C. Kahwati, C.E.Golin, et al. Medication therapy management interventions in outpatient settings. A systematic review and meta –

- analysis. (2015) Pg.No. 76-87 www.ncbi.nlm.nih.gov/books .com
4. Dandiya PC. Pharmaceutical education in india : An introspection for better future pharma times 2011 www.mypharmagiude.com
 5. Kokate CK Pharmaceutical education in india vision 2010 indian J Pharm Edu; 77-33 1999, www.pharmawiki.in
 6. [Wikipedia.org/clinical pharmacy and public health education](http://Wikipedia.org/clinical%20pharmacy%20and%20public%20health%20education) [www.en.m.wikipedia.org/wiki/clinical pharmacy.com](http://www.en.m.wikipedia.org/wiki/clinical_pharmacy.com)
 7. "Economic Evaluations of clinical pharmacy services pharmacotherapy. ACCP.Retrieved 28 April 2016 www.ncbi.nlm.nih.gov.com
 8. "About clinical pharmacists" American College Of Clinical Pharmacy. Retrieved 2015 pg.no.10-20 www.accp.com
 9. Greer N,Bolduc J, Geurkink E, Rector T, Olson K, Koeller E, MacDonald R, Wilt TJ Book of Pharmacist –led chronic Disease Management : A systematic Review of Effectiveness and Harms Compared with Usual Care " Annals of Internal PMID Medicine 165 2016 www.ncbi.nlm.nih.gov.com
 10. Co"llaborative drug therapy management (CDTM)" Pharmacists Letter /Prescribers Letter. 25 2009. www.nyschp.org.com
 11. "Collaborative practice Agreements" AMCP. Archeived from the original of September 17,2010 www.ncbi.nlm.nih.gov.com
 12. An Hoti K, Hughes j, sunderland B An Expanded prescribing role for pharmacist- an Australian perspective The Australian Medical Journal (2011-04-30) www.ncbi.nlm.com
 13. Overview of clinical pharmacist practitioner in NC, North Carolina Association of Pharmacist Archived from the original on 23 May 2005 www.ncbop.org.com
 14. The Role Of Clinical Pharmacist In Health Care System – A Review
 15. Medscape Mobile Available from www.medscape.com/public/mobileapp
 16. Thomson Reuters, Healthcare App Available from www.healthcare.thomsonreuters.com/micromedexmobile
 17. Dooley M, Bogovic A, Carroll A, Cuell S, Galbraith K. Matthews H. SHPA standards of pratice for clinical pharmacy www.shpa.org.au/lib/pdf/practice_standards/clinical_pharm_ro.pdf
 18. Jain S.Basu S, parmar VR. Medication errors in neonates admitted in intensive care unit and emergency department. Indian J Med Sci 2009 www.scholar.google.com
 19. Guidelines on Counseling November Appendix A 2005 [www.napra.org/content_Files/Files/PEI/StandardsGuideline-on Counseling. Pdf](http://www.napra.org/content_Files/Files/PEI/StandardsGuideline-on%20Counseling.Pdf) 2011
 20. Malathy R. Narmadha M, Ramesh S Alvin JM, Dinesh BN Effect of a diabetes counselling programme on knowledge, attitude and practice among diabetic patients in Erode district of south India www.scholar.google.com
 21. Palaian S Prabhu M Shankar PR Patient counselling by pharmacist – A focus on chronic illness www.scholar.google.com
 22. Joyce AW, Sunderland VB, Burrows S, McManus A, Howat P, Maycock B. Community pharmacys role in promoting healthy behaviours. www.researchgate.com
 23. Pharm D New Delhi : Ministry Of Health and Family Welfare (Pharmcy Council Of India) 2008 www.pci.nic.in
 24. Gazette Notification on Minimum Qualification for Teachers in Pharmacy Institutions Regulation Pharmacy Council Of India 2014 Available from www.pci.nic.in
 25. Sharma S How to become a competent medical writer? www.scholar.google.com
 26. What is the medical Coding ? AAPC (American Academy of Professional Coders) www.aapc.com/medical-coding/medical-coding.aspx
 27. What is medical Billing? (American Academy of professional coders) www.aapc.com/medical-billing/medical-billing.aspx
 28. AHDI Answers Frequently Asked Question about medical Transcription AHDI(Association of Health care Documentation Integrity) Available from www.ahdionline.org/vistor
 29. The Role Of Clinical Pharmacist In Health Care System – A Review
 30. World Health Organization Pharmacovigilance Essential Medicines and Health product available from www.who.int/medicines/areas/quality_safety/safety_efficacy/pharmvigi/en.
 31. Burton ME,Munger MA, BednarczykEM,Davis LE, Davis GA, Elliot MEm et al. Update: The Clinical pharmacist as principal investigator available from www.accp.com/docs.
 32. www.who.int/medicines/areas/quality_safety/safety_efficacy/pharmvigi/en.
 33. DurrantKL. Florida : University Of Florida College of pharmacy . Pharmacists Role In Enhancing Patient Participation In ellinicla Trial Research. Available from : www.pharmacy.ufl.edu
 34. Anderson PD. The broad filed of forensic pharmacy .J Pharmwww.scholar.google.com
 35. What is medical science Liaison? MSLS (Medical Science Liaison Society) Available from www.themsls.org
 36. Bhambri R, Khan R,Lam A, AbdulsattarY,schnell A Working Outside the Dispensing Box : The Roles of the Medical Information Specialist and Medical Science Liaison.www.pharmacytimes.com
 37. Gupta SK, Nayak RP. An insight into the emerging role of regional medical advisor in the pharmaceutical industry.www.scholar.google.com
 38. Stergachis A, Lander R. Webb.L. promoting the pharmacists role in public www.scholar.google.com
 39. Wingate D, Philips SF,Lewis SJ, Malagelada JR, speelmanP,Steffen R, Guideline for adults on self –medication for the treatment of acute diarrhoea.

Alimentary Pharmacology and Therapeutics. 2001;[www://dx.doi.org/10.1046/j1365-2036.2001.00993.x](http://dx.doi.org/10.1046/j1365-2036.2001.00993.x)

40. Horn JR, Philip DH. Loperamide : Danger Of Elevated plasma Concentrations.2016www.wjcmpr.com

41. Mehran ZMD, Maryam RMD. LoperamideDependency : A Case Report. Addict