



ISSN (E): 2277- 7695
 ISSN (P): 2349-8242
 NAAS Rating: 5.03
 TPI 2019; 8(11): 321-326
 © 2019 TPI
 www.thepharmajournal.com
 Received: 15-09-2019
 Accepted: 18-10-2019

Humayun Riaz

Rashid Latif College of
 Pharmacy, 35-Km Ferozepur
 Road, Lahore-Pakistan

Syed Atif Raza

(1) Punjab University College of
 Pharmacy, University of the
 Punjab, Lahore-Pakistan
 (2) Pakistan Homeopathic
 College, Hospital and Research
 Center, Lahore, Pakistan

Sajjad Ali

(1) Rashid Latif College of
 Pharmacy, 35-Km Ferozepur
 Road, Lahore-Pakistan
 (2) Pakistan Homeopathic
 College, Hospital and Research
 Center, Lahore, Pakistan

Worldwide role of clinical pharmacists in optimizing patient health: A systematic review

Humayun Riaz, Syed Atif Raza, and Sajjad Ali

Abstract

Background: In many under developed countries, role of clinical pharmacists is not well established. Whereas, world widely in developed countries pharmacists in clinical settings are playing very vital role in optimizing therapeutic regimens, minimizing drug therapy problems (DTPs) & issuance of drug safety alerts to the healthcare professional for preventing & management of Adverse drug reactions. Thus our systematic review is aimed to evaluate the role of clinical pharmacists in healthcare settings.

Methodology: A comprehensive computerized literature search was carried out to find clinical research articles. Pub med, Medline, Google scholars & science direct was searched extensively.

Results: Total 40 research articles were studied for the review. Irrelevant and duplicated articles were removed. Total 23 articles were selected for the systematic review.

Conclusion: This systematic review concluded that clinical pharmacists have the great potential to play an active role in the management of chronic illnesses, optimizing therapeutic regimens, minimizing the risk of development of ADRs and make considerable savings in healthcare costs.

Keywords: Clinical Pharmacy, Adverse drug reactions, Pharmacists work up of drug therapy, Drug therapy problems

1. Introduction

Clinical pharmacists are trained in therapeutics & provide comprehensive drug management to the patients and all the other healthcare professionals including physicians. Pharmacist intervention outcomes include health related quality of life, economics, patient satisfaction, appropriateness of medication, adverse drug events & adverse drug reactions (Kaboli, Hoth, McClimon, & Schnipper, 2006) ^[17]. A study indicated that both centrally based & patient-specific clinical pharmacy services are associated with reduction in hospital mortality rates. This study suggested that clinical pharmacy service have saved a significant number of lives in those hospitals where clinical pharmacists are working (McKENNEY, Slining, Henderson, Devins, & Barr, 1973) ^[18]. More importantly clinical pharmacists are playing key role in reduction of medication cost (Bond, Raehl, & Franke, 1999). Pharmacist and patient encounters can remarkably increase patient acceptance of medical care services (Helling, Hepler, & Jones, 1979) ^[12].

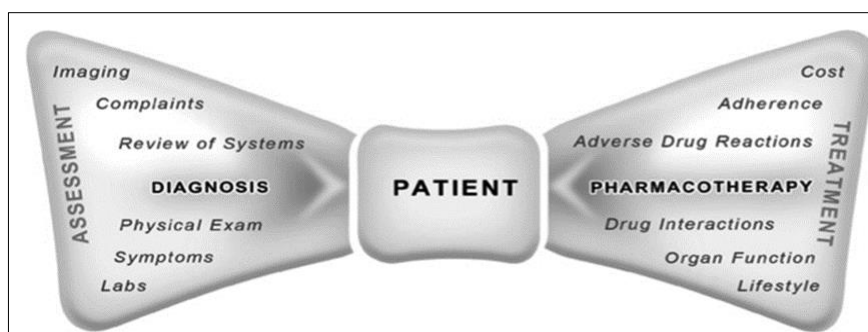


Fig 1: The Bowtie Phenomenon of Team-Based Care ((Mohiuddin, 2019) ^[20]).

A study showed that suboptimal use of medication lead to, mortality, morbidity and increased treatment costs. In order to reduce unnecessary patient harm, medication reviews can be provided by the clinical pharmacists in healthcare settings (Graabæk & Kjeldsen, 2013) ^[9].

A substantial number of studies have showed the positive effects of services provided by the

Corresponding Author:**Sajjad Ali**

(1) Rashid Latif College of
 Pharmacy, 35-Km Ferozepur
 Road, Lahore-Pakistan
 (2) Pakistan Homeopathic
 College, Hospital and Research
 Center, Lahore, Pakistan

clinical pharmacists on psychiatric patient health outcomes, including improved level of functioning, and reduction of

pharmaceutical care costs (Jenkins & Bond, 1996) ^[15]

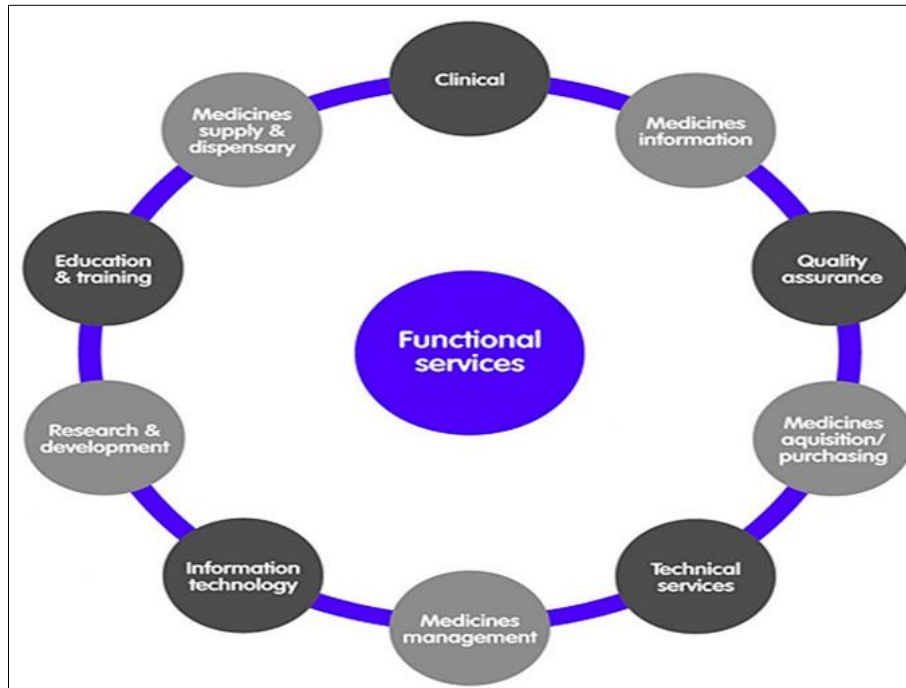


Fig 2: Role of Hospital Pharmacists (Mohiuddin, 2019) ^[20].

2. Methodology

The aim of this systematic review is to identify, assess and summarize the literature on the role of clinical pharmacists in healthcare setting for optimization of patient health.

A comprehensive computerized literature search was carried out to find role of clinical pharmacists in healthcare settings. Pub med, Medline, Google scholars, science direct was searched extensively.

Total 40 research articles were studied for the review. Irrelevant and duplicated articles were removed. Two reviewers independently screened the articles Total 23 articles were selected for the systematic review.

3. Results

Total 40 research articles were studied for the review. Irrelevant and duplicated articles were removed. Total 21 articles were selected for the systematic review. A comparative study was conducted by Trine Graabæk and Lene Juel Kjeldsen. They concluded that the suboptimal dosing will lead to increased medication costs, morbidity & mortality. A study showed that among ambulatory elderly patients 10% of reported adverse drug events were fatal or life-threatening

(Gurwitz *et al.* 2003) ^[10]. The estimated cost associated with adverse drug events (ADEs) is \$10–23 million per 100,000 admissions (Beijer & De Blaey, 2002) ^[2]. A meta-analysis demonstrated that about half of the adverse drug reactions (ADRs) causing morbidity can be prevented (Hakkarainen, Hedna, Petzold, & Hägg, 2012) ^[11].

Unnecessary patient harm can be reduced by the services provided by clinical pharmacists working in collaboration with the other healthcare professionals. Clinical pharmacists have an important role in providing medication reviews with the purpose of identifying drug-related problems for optimizing the medical treatment (Webb & Maxwell, 2002) ^[23]. While conducting medication reviews the clinical pharmacist assesses the therapeutic regimens in the context of the condition of patient and symptoms (de Wit *et al.* 2013) ^[7]. A study conducted in UAE suggested that physicians working in UAE considering pharmacists as a knowledgeable drug experts. Clinical pharmacists working in collaboration with the other healthcare providers have a very positive impact on patient's quality of life & healthcare efficiency (Ibrahim & Ibrahim, 2014) ^[13].

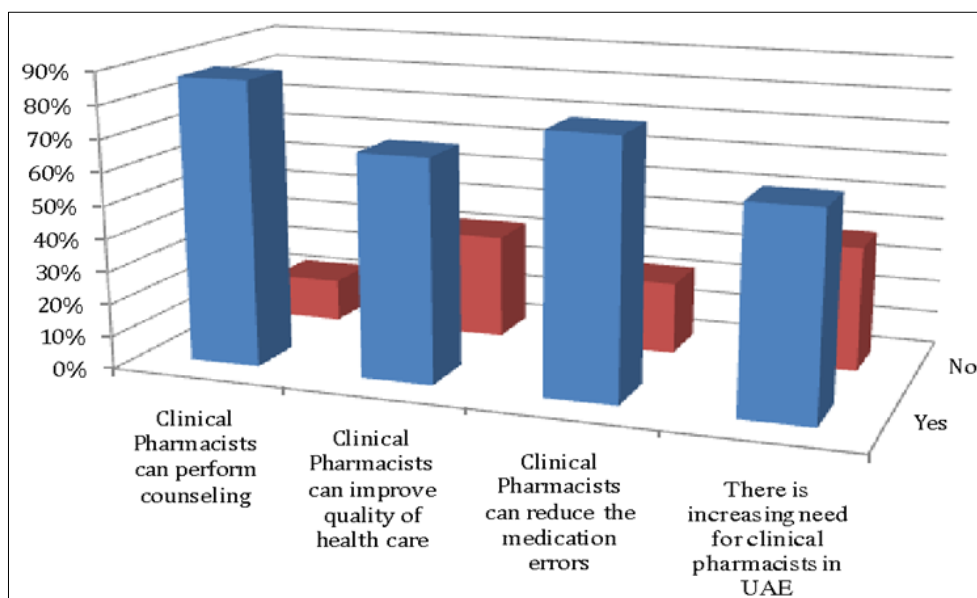


Fig 3: Expectations of UAE Physicians from the Clinical Pharmacists (Ibrahim *et al.* 2014) ^[13].

During the 2nd, 3rd and 4th quarters of a study there were significant differences in the change in SBP & DBP from the baseline between the intervention & control groups ($P < 0.01$). There was a significant reduction in mean SBP in the intervention group at the 2nd (137.8 +/- 15.0 vs 168.9 +/- 15.3), 3rd (135.9 +/- 11.7 vs 164.6 +/- 20.1) & 4th (145.3 +/- 16.8 vs 175.8 +/- 33.9) quarters of the study ($P < 0.05$).

In addition to the routine clinical services, direct patient care provided by the clinical pharmacists have a very positive the blood pressure lowering effect in African-American patients with renal transplant (Chisholm, Mulloy, Jagadeesan, Martin, & DiPiro, 2002) ^[6].

Drug therapy failures can be managed by introducing a Pharmaceutical Care system. Pharmaceutical Care services are outcome oriented to provide drug therapy for improvement of all the dimensions of health related quality of life of the patients by clinical pharmacists (Hepler, 1996).

In order to reduce sub-optimal prescribing practices, clinical pharmacy services offered to four orthopedic surgical wards. Clinical pharmacy services offered to four orthopedic surgical wards resulted in reduction of sub-optimal prescriptions. Every time among 07 patients one sub-optimal prescription was found and adjusted by pharmacist (Buck, Brandstrup, Brandslund, & Kampmann, Buck) ^[16].

87% of the physicians stated that the clinical pharmacist is capable of offering primary healthcare services to the patients once they are diagnosis by a physician; 95% of physicians felt that the role of the pharmacist can be transferrable to the emergency department (Elenbaas, Waeckerle, & McNabney, 1977) ^[8].

A meta-analyses including 298 studies were conducted which showed favorable therapeutic outcomes of hemoglobin(Hb), HbA1c, LDL cholesterol, blood pressure (BP) & adverse drug events ($P < 0.05$), which are favoring the role of clinical pharmacists in direct patient care over comparative services. Patient compliance, patient knowledge regarding disease and

its management and quality of life meta-analyses were significant ($P < 0.05$), favoring the role of pharmacists in the direct patient care (Chisholm-Burns *et al.* 2010) ^[5].

Increased pharmacist presence in the PICU (pediatric clinical pharmacists in pediatric intensive care unit) is associated with increased number of interventions & prevention of adverse drug events (ADEs). Participation of the clinical pharmacists during rounds substantially improved the care of critically ill children (Tripathi, Crabtree, Fryer, Graner, & Arteaga, 2015) ^[22]. Patient outcome in COPD is enhanced as a result of the pharmaceutical care services (Jarab, AlQudah, Khmour, Shamsain, & Mukattash, 2012) ^[14]. Clinical pharmacists can play an important role in taking preventive measures and educating patients regarding reducing HCV transmission, improvement of medication adherence and in the recommendation of treatment strategies to minimize adverse effects (ADRs) and drug interactions. Clinical pharmacists can improve patient outcomes and reduce the healthcare costs (Mohammad *et al.* 2014) ^[19]. In USA clinical pharmacists are directly involved as caregivers in about two-thirds of patients admitted in ICUs (MacLaren *et al.* 2006) ^[17]. A study showed that over a period of 4.5 months total of 129 interventions were documented. 40% interventions were identified during patient chart review & 39 % during patient care ward rounds. These interventions had a great impact on cost of the therapy (Kopp, Mrsan, Erstad, & Duby, 2007) ^[16]. Lipid profiles of dyslipidemic patients has been improved by the Implementing clinical pharmacy services in Jordan (Tahaineh, Albsoul-Younes, Al-Ashqar, & Habeb, 2011) ^[21]. A study showed that when pharmacists prospectively reviewed the patient charts/ ED medication orders the rate of medication errors (ME) decreased significantly (Brown *et al.* 2008) ^[4]. The healthcare professionals (caregivers) who are well aware of clinical pharmacy services & clinical pharmacists have very good impact healthcare system. (Abbas, Shah, Khan, Nasir, & Khan, 2015) ^[1].

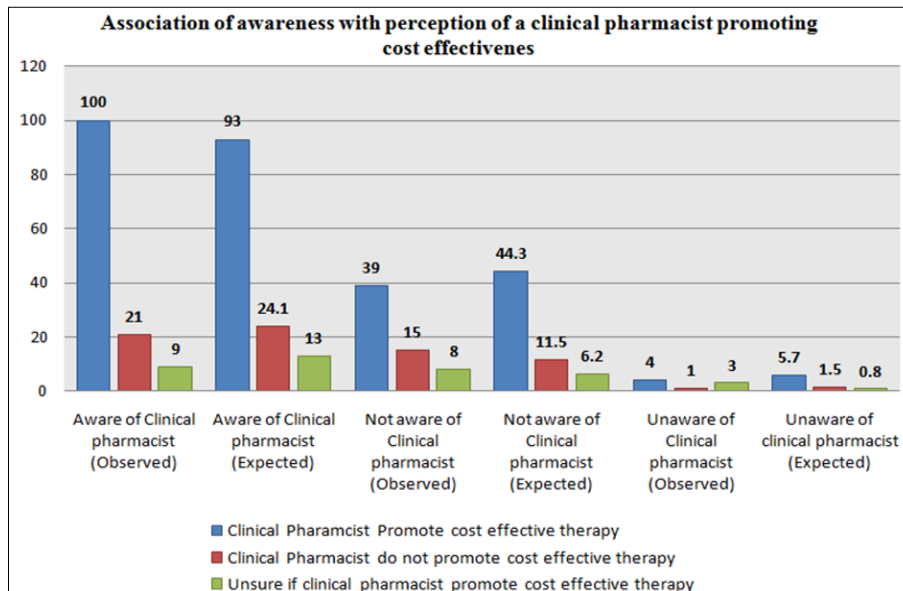


Fig 4: Association of awareness with perception of clinical pharmacist promoting cost effectiveness (Abbas *et al.* 2015) [1].

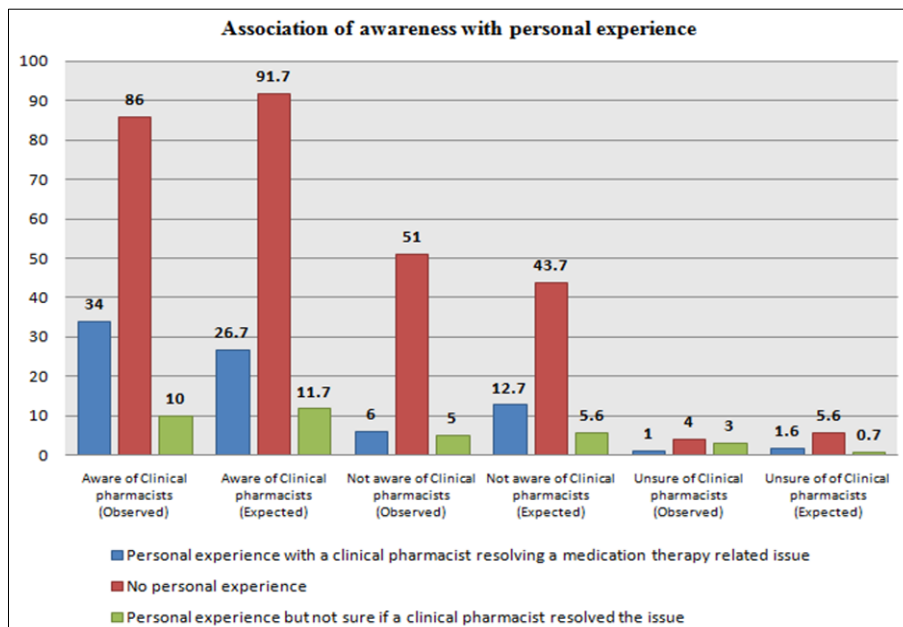


Fig 5: Association of awareness with personal experience (Abbas *et al.* 2015) [1].

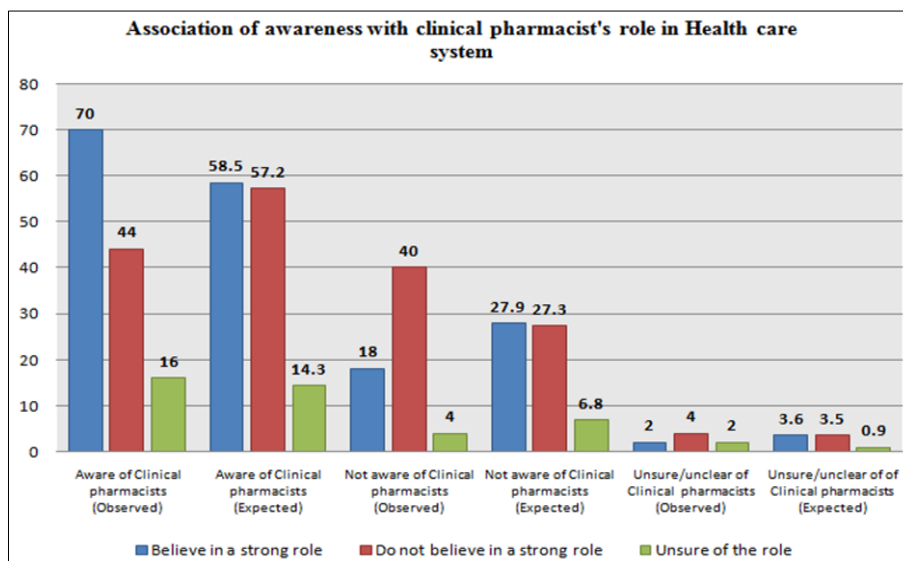


Fig 6: Association of awareness with clinical pharmacist's role in Healthcare system (Abbas *et al.* 2015) [1].

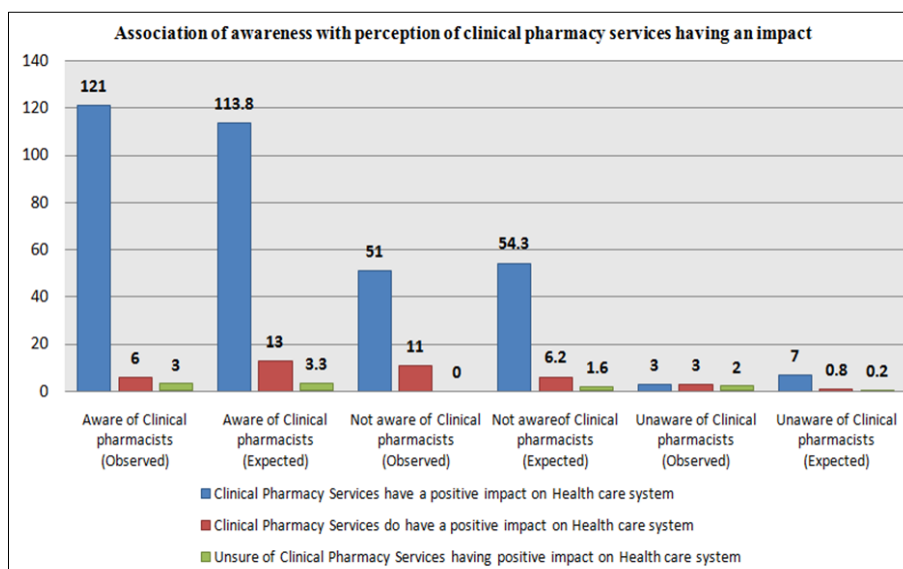


Fig 7: Association of awareness with perception of clinical pharmacy services having impact. (Abbas *et al.* 2015) [1].

4. Discussion

This systematic review concluded that clinical pharmacists have the great potential to play an active role in the management of chronic illnesses, optimizing therapeutic regimens, minimizing the risk of development of ADRs and make considerable savings in healthcare costs.

In many under developed countries, role of clinical pharmacists is not well established. Whereas, world widely in developed countries pharmacists in clinical settings are playing very vital role in optimizing therapeutic regimens, minimizing drug therapy problems (DTPs) & issuance of drug safety alerts to the healthcare professional for preventing & management of Adverse drug reactions. Thus our systematic review was aim to evaluate the role of clinical pharmacists in healthcare settings.

Increased pharmacist presence in the PICU (pediatric clinical pharmacists in pediatric intensive care unit) is associated with increased number of interventions & prevention of adverse drug events (ADEs). Participation of the clinical pharmacists during rounds substantially improved the care of critically ill children (Tripathi, Crabtree, Fryer, Graner, & Arteaga, 2015) [22]. Patient outcome in COPD is enhanced as a result of the pharmaceutical care services (Jarab, AlQudah, Khmour, Shamsain, & Mukattash, 2012) [14].

Clinical pharmacists can play an important role in taking preventive measures and educating patients regarding reducing HCV transmission, improvement of medication adherence and in the recommendation of treatment strategies to minimize adverse effects (ADRs) and drug interactions. Clinical pharmacists can improve patient outcomes and reduce the healthcare costs (Mohammad *et al.* 2014) [19].

In USA clinical pharmacists are directly involved as caregivers in about two-thirds of patients admitted in ICUs (MacLaren *et al.* 2006) [17].

A study showed that over a period of 4.5 months total of 129 interventions were documented. 40% interventions were identified during patient chart review & 39 % during patient care ward rounds. These interventions had a great impact on cost of the therapy (Kopp, Mrgan, Erstad, & Duby, 2007) [16]. Lipid profiles of dyslipidemic patients have been improved by the Implementing clinical pharmacy services in Jordan (Tahaineh, Albsoul-Younes, Al-Ashqar, & Habeb, 2011) [21]. A study showed that when pharmacists prospectively

reviewed the patient charts/ ED medication orders the rate of medication errors (ME) decreased significantly (Brown *et al.* 2008) [4].

Unnecessary patient harm can be reduced by the services provided by clinical pharmacists working in collaboration with the other healthcare professionals. Clinical pharmacists have an important role in providing medication reviews with the purpose of identifying drug-related problems for optimizing the medical treatment (Webb & Maxwell, 2002) [23]. While conducting medication reviews the clinical pharmacist assesses the therapeutic regimens in the context of the condition of patient and symptoms (de Wit *et al.* 2013) [7].

5. Conclusion

This systematic review concluded that clinical pharmacists have the great potential to play an active role in the management of chronic illnesses, optimizing therapeutic regimens, minimizing the risk of development of ADRs and make considerable savings in healthcare costs. Role of clinical pharmacists in direct patient care has been established in developed countries. Whereas, in many under developed countries like Pakistan clinical pharmacy services are in their establishment phase. Primary & Secondary healthcare department, Govt. of the Punjab has notified CPPOs (Clinical Pharmacy & Pharmacovigilance officers) at DHQ hospitals across the whole province of Punjab-Pakistan. They are playing very vital role as for prevention, documentation and management of drug-drug interactions & ADR (adverse drug reactions) are concerned.

Involvement of clinical pharmacists in healthcare settings as direct care givers can bring a remarkable change as for as optimization of therapeutic regimen and prevention of occurrence of ADRs are concerned.

6. References

1. Abbas A, Shah A, Khan N, Nasir H, Khan MH. Perceptions of patients' caregivers regarding clinical pharmacists and their practice in a developing country. *Int J Pharm Pharm Sci.* 2015; 7(2):168-173.
2. Beijer H, De Blaey C. Hospitalisations caused by adverse drug reactions (ADR): a meta-analysis of observational studies. *Pharmacy World and Science.* 2002; 24(2):46-54.
3. Roy AD, Mitra R, Ghosh S, Pramanik S, Das S, Nair VR.

- Requirement and impact of clinical pharmacy practice in modern healthcare systems in India: A review.
4. Brown JN, Barnes CL, Beasley B, Cisneros R, Pound M, Herring C. *et al.* Effect of pharmacists on medication errors in an emergency department. *American Journal of Health-System Pharmacy.* 2008; 65(4):330-333.
 5. Chisholm-Burns MA, Lee JK, Spivey CA, Slack M, Herrier RN, Hall-Lipsy E. *et al.* US pharmacists' effect as team members on patient care: systematic review and meta-analyses. *Medical care,* 2010; 923-933.
 6. Chisholm MA, Mulloy LL, Jagadeesan M, Martin BC, DiPiro JT. Effect of clinical pharmacy services on the blood pressure of African-American renal transplant patients. *Ethnicity & disease.* 2002; 12(3):392-397.
 7. de Wit HA, Gonzalvo CM, Hurkens KP, Mulder WJ, Janknegt R, Verhey FR. *et al.* Development of a computer system to support medication reviews in nursing homes. *International journal of clinical pharmacy.* 2013; 35(5):668-672.
 8. Elenbaas RM, Waeckerle JF, McNabney WK. The clinical pharmacist in emergency medicine. *American Journal of Health-System Pharmacy.* 1977; 34(8):43-846.
 9. Graabæk T, Kjeldsen LJ. Medication reviews by clinical pharmacists at hospitals lead to improved patient outcomes: a systematic review. *Basic & clinical pharmacology & toxicology.* 2013; 112(6):359-373.
 10. Gurwitz JH, Field TS, Harrold LR, Rothschild J, Debellis K, Seger AC. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. *Jama.* 2003; 289(9):1107-1116.
 11. Hakkarainen KM, Hedna K, Petzold M, Hägg S. Percentage of patients with preventable adverse drug reactions and preventability of adverse drug reactions-a meta-analysis. *PloS one.* 2012; 7(3):33236.
 12. Helling DK, Hepler CD, Jones ME. Effect of direct clinical pharmaceutical services on patients' perceptions of health care quality. *American journal of hospital pharmacy.* 1979; 36(3):325-329.
 13. Ibrahim OM, Ibrahim R. Perception of physicians to the role of clinical pharmacists in United Arab Emirates (UAE). *Pharmacology & Pharmacy.* 5(09):895.
 14. Jarab AS, AlQudah SG, Khodour M, Shamssain M, Mukattash TL. Impact of pharmaceutical care on health outcomes in patients with COPD. *International journal of clinical pharmacy.* 2012; 34(1):53-62.
 15. Jenkins MH, Bond C. The impact of clinical pharmacists on psychiatric patients. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy.* 1996; 16(4):708-714.
 16. Kopp BJ, Mersan M, Erstad BL, Duby, JJ. Cost implications of and potential adverse events prevented by interventions of a critical care pharmacist. *American Journal of Health-System Pharmacy.* 2007; 64(23):2483-2487.
 17. MacLaren R, Devlin JW, Martin SJ, Dasta JF, Rudis M. I. *et al.* Critical care pharmacy services in United States hospitals. *Annals of Pharmacotherapy.* 2006; 40(4):612-618.
 18. McKinney JM, Slining JM, Henderson HR, Devins D, Barr M. The effect of clinical pharmacy services on patients with essential hypertension. *Circulation.* 1973; 48(5):1104-1111.
 19. Mohammad RA, Bulloch MN, Chan J, Deming P, Love B, Smith L. Provision of clinical pharmacist services for individuals with chronic hepatitis C viral infection: Joint Opinion of the GI/Liver/Nutrition and Infectious Diseases Practice and Research Networks of the American College of Clinical Pharmacy. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy.* 2014; 34(12):1341-1354.
 20. Mohiuddin A. Pharmacists in Public Health: Scope in Home and Abroad. *SOJ Pharmacy and Pharmaceutical Sciences.* 2019; 6:1-23.
 21. Tahaineh L, Albsoul-Younes A, Al-Ashqar E, Habeb A. The role of clinical pharmacist on lipid control in dyslipidemic patients in North of Jordan. *International journal of clinical pharmacy.* 2011; 33(2):229-236.
 22. Tripathi S, Crabtree HM, Fryer KR, Graner KK, Arteaga GM. Impact of clinical pharmacist on the pediatric intensive care practice: an 11-year tertiary center experience. *The Journal of Pediatric Pharmacology and Therapeutics.* 2015; 20(4):290-298.
 23. Webb DJ, Maxwell SR. A spoonful of sugar? Tomorrow's Doctors *British journal of clinical logy.* 2002; 54(4):341.
 24. Bond C, Raehl CL, Franke T. Clinical pharmacy services, pharmacist staffing, and drug costs in United States hospitals. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy.* 1999; 19(12):1354-1362.