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## Steps and Impacts of Pharmaceutical Care and Clinical Pharmacy Development on Clinical Outcomes 2016: A Historical Analysis Compared with Results

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**Abstract.** This article investigates the observations over some relevant steps and the resulting effects obtained in clinical pharmacy and pharmaceutical care discipline in improving further clinical outcomes (as member of medical team). With the emerging innovative forms such as macromolecules, delivery systems and nanoparticles, there will be a much greater role for those professionals who understand the science of pharmacokinetics, pharmaceutical chemistry and pharmacodynamics. Particularly for these costly products, clinical and hospital pharmacists, imaging and laboratory professionals' active and interactive role is crucial. Our conclusion: the medical system needs flexibility and adjustments.

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**Keywords:** Pharmaceutical Care, Clinical Pharmacist, Imaging, Medical Laboratory, Hospital Settings, Medication Cost, Clinical Outcomes, Innovative Therapy

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### Introduction

The introduction in practical clinical activity of pharmaceutical care and clinical pharmacy instruments has given positive effect further in some patient's clinical outcomes.

### Materials and Methods

We observed some steps in evolution of the discipline involved in pharmaceutical care and clinical pharmacy and the studies over results of some relevant clinical outcomes enhancement.

Period under observation: 1928-2016:

Clinical pharmacy developed as autonomous discipline from classic pharmacy. In USA in hospital settings, long ago, back in the 1928, the pharmacists at the Hospital University of Iowa began participating in patient rounds in medical team.

Eugene White pharmacist in USA, known as the father of clinical pharmacy, way back in the early 60s, remodeled his commercial drugstore into an office style practice. He was the first to

use both patients profile cards (Clinical based pharmacy) and patient medication profiles in a community pharmacy.

*“Besides dedicating his office to his profession, Dr. White rebelled against the 1960s protocol that forbade pharmacists to counsel patients or collaborate with physicians. Instead, he learned about his patients' medical histories and developed a patient records system detailing their medications, allergies and other idiosyncrasies. He used that knowledge to advise patients and their doctor.”* according to Richmond Times-Dispatch

University of Michigan 1960, pioneering work at Univ. of Kentucky J Clin Pharmacol.1981 21(4):195-7. First Clinic-Based Pharmacy Service.

Howard P., An introduction to the clinical laboratory for pharmacists. Hosp Pharm. 1984 Jun;19(6):425-6, 430-

*“Laboratory results are an essential tool for pharmacists involved in monitoring drug therapy and adjusting dosing regimens. Laboratory medicine, however, is a complex and rapidly changing field with new analytical techniques and instruments continually being Pharmacists should utilize the medical technologist as a consultant on the interpretation and limitations of laboratory tests. Likewise, there are many areas, such as therapeutic drug monitoring, in which the pharmacist can serve as a consultant to the laboratory. Pharmacists involved in patient care will benefit from a greater understanding of the clinical laboratory, and may also find new opportunities for clinical pharmacy practice and interaction with other health care professionals”*<sup>1</sup>

1986 Nuffield report officially recognize Clinical Pharmacy in UK

In 1994 Shaw M. wrote: “pharmacists, not only specialists, must be knowledgeable of the role diagnostic imaging plays in pharmaceutical care; diagnostic imaging is utilized to follow the course of therapy; i.e. determining therapeutic outcomes.”<sup>2</sup>

Pharmacotherapy 2000, ACCP Position paper on critical care pharmacy service: pharmacists have demonstrated a role in the management of drug cost, reductions in morbidity and mortality<sup>3</sup>

Papadopoulos et al: pharmacotherapy 2002 the critical care pharmacist: an essential intensive care practitioner.<sup>4</sup>

Bond C.A, et al. in 2007 clinical pharmacy service, pharmacy staffing, and hospital mortality rates: “In seven hospitals, clinical pharmacy service reduces mortality rates.” In a significant way”.<sup>5</sup>

Koshman et al: 2008 pharmacist care in the treatment of patients with heart failure reduce the risk of all cause and HF hospitalization s ... the incorporation of pharmacist into HF care teams should be strongly considered (systematic review of randomized trials).<sup>6</sup>

Chisholm et al. 2010 in “Pharmacist’s effect as team members on patient care: systematic review and meta-analyses”: “pharmacists provided direct patient care has favorable effects across various patient outcomes, health care settings, and disease states. (significant p<0,005).<sup>7</sup>

2015 Pharmacist cognitive service and pharmaceutical care: today and tomorrow outlook UKJPB, Luisetto, Carini, Bologna, Nili, UK J Pharm & Biosci, 2015: 3(6); 71

*”This article wants to improve the pharmaceutical care application in countries with an advanced healthcare system in order to provide more rational drug therapy to patients. When this is not possible, it would be a good idea using pharmaceutical care, in particular populations such as: severe disease, critically ill, patients with multiple illnesses, transplants,*

*immunosuppression, oncology or other serious conditions, at least when the treatments cost a lot.” And “In these studies, we observe a general positive influence of pharmacist’s presence in the medical team also in different clinical outcomes.”<sup>8</sup>*

2016 Luisetto, Nili in an open letter to all clinical pharmacists: 2016 pharmaceutical care, medical laboratory and imaging

*“for the sake of patient's safety and health as well as cost reduction and for clinical pharmaceutical care purposes , it is incumbent upon the hospital to engage and demand an active role from clinical pharmacists not only limited to but especially in field such as medical laboratory and imaging”<sup>9</sup>*

Obviously, someone like a pharmacist who has a solid sight on what would be the fate of drug molecule once is unleashed in the blood stream, as far as its accumulation, bonds to different macromolecules, chemical modifications that goes through in the chemical factories, mainly in liver and bile, as well as receptorial interactions with different receptors, etc can shed much more light and prevent the avoidable errors that result in harms to the patient. Due to economical factors and the fact that patients have greater access to the pharmacists than the physicians, pharmacists, especially those specialized in clinical areas can play an important role in reducing risks and preventing errors that sometimes could put severely risk lives.

Today, we are not dealing only with ordinary drug molecules with traditional dosage forms, anymore. Today, the world of medication is much more complex, because the number of classes of products is much wider. Even for small molecules, a clinical pharmacist active interaction with patient could have saved lives.

We are dealing with immunoglobulins, genes, enzymes, nanoparticles, and many other innovative forms that many things can go wrong, if there won't be an active and interactive patient compliance with a medical team. It makes very difficult, if not impossible, for one profession alone, namely physician to control surprises that may leave unrepairable damages. These systems are not as simple as small molecules, they interact with cells and tissues by mechanisms that are not simple hydrophilic-hydrophobic partition, crossing barriers based on simple conjugation to receptors etc, therefore a vigilant presence with an easy access would be a real safeguarding of patient health. Besides the cost of these medications are so high that no one, not even governments, can afford errors or mistakes. Added to that, a great help could come into the picture by laboratory and imaging professionals.

## Results

During the periods of 1928 to 2016 a progressive and trendy development of clinical pharmacy and pharmaceutical care was developed, as a new discipline.

This approach was observed not only in hospital settings, but also in community pharmacy in different ways, although with the same philosophy (patient-oriented pharmaceutical discipline)

It was also observed a tendency of clinical pharmacist in field of medicine laboratory and imaging for when they were related to the therapy and its monitoring.

Clinical pharmacists today are employed to reduce therapy errors and contain medication cost burdens. In addition to that what we have observed was a “general positive influence of the pharmacist’s presence as a part of the medical team, on public health as well as in various clinical outcomes”; this according to clinical studies as systematic reviews, clinical trials and meta-analysis.

## **Discussions**

In order to have a better rational therapy (multiprofessional team), such general positive effects obtained in some clinical outcomes using a pharmaceutical care management approach in medical team has become one of the most prominent objectives of today's healthcare authorities.

## **Conclusions**

Such effects, achieved by clinical pharmacists in the last decades, direct us to a helpful and promising path for future results in the betterment of healthcare system.

The pharmacists are considered universally as top DRUG specialists and when it comes to many aspects of drug use related to: pharmaceutical chemistry, pharmacokinetics, toxicology, laboratory assay, imaging, clinical data, EBM and other discipline.

Sharing the scientific knowledge in medical team and adding clinical pharmacy expertise now-a-day is essential to give much better results in various clinical outcomes.

Our final conclusion: It's long overdue; the medical system needs flexibility and adjustments.

## **Bibliography:**

1. Howard P, An Introduction to the Clinical Laboratory for Pharmacists, Hosp Pharm. 1984 Jun; 19(6): 425-6, 430-1.
2. S Shaw, Diagnostic Imaging and Pharmaceutical Care, American J. of Pharmaceutical Education, 1994, 58, 2
3. Pharmacotherapy 2000: ACCP Position paper on critical care pharmacy service: pharmacists have demonstrated a role in the management of drug cost reductions in morbidity and mortality
4. Papadopulos et al, Pharmacotherapy 2002, the critical care pharmacist: an essential intensive care practitioner.
5. Bond C A, et al. in 2007, clinical pharmacy service, pharmacy staffing, and hospital mortality rates: “ in seven hospital, clinical pharmacy service reduces mortality rates.” In a significant way
6. Koshmann et al, Arch Intern Med, 2008, Apr 14: Pharmacist Care of Patient with Heart Failure. Systematic Review of Randomized Trials
7. Chisholm et al. 2010 in “Pharmacist’s effect as team members on patient care: systematic review and meta-analyses”: “pharmacists provided direct patient care has favorable effects across various patient outcomes, health care settings, and disease states.(significant  $p < 0,005$ ).
8. Luisetto et al: An Open Letter to All Clinical Pharmacists: 2016 Pharmaceutical Care, Medical Laboratory, Nuclear Medicine and Imaging Clinicians Teamwork Bulletin, Vol 1, Pag 1-3, 3/3/2016
9. Luisetto et al: Pharmacist Cognitive Service and Pharmaceutical Care: Today and Tomorrow Outlook UKJPB 2015 Vol 3 (6) 67-72.