ISSN: 2230-7346

Siddarama. R et al. / JGTPS / 6(2)-(2015) 2572– 2578

(ReviewArticle)

Journal of Global Trends in Pharmaceutical Sciences

Journal home page: www.jgtps.com

CLINICAL PHARMACY SERVICES IN CARDIOVASCULAR DISEASE PATIENTS

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ABSTRACT

Clinical pharmacy is deemed an integral component of a health care system. The presence of clinical pharmacists in medical rounds could assist physicians in optimizing patients' pharmacotherapy. Moreover, clinical pharmacists may reduce adverse effects and medication errors insofar as they contribute significantly to the detection and management of drug related problems, not least in patients with cardiovascular diseases, who have the highest rank in the frequency of medication errors. Clinical pharmacists can also collaborate with physicians in the management of cardiovascular risk factors as well as anticoagulation therapy based on patients' specific situations. In summary, the practice of clinical pharmacy is considered a crucial part of a health care team to improve the level of patients' care by increasing the quality of therapy with the least expense for a health care system.

Keywords: clinical pharmacy/pharmacist and cardiology, cardiovascular, cardiac, heart failure, hypertension, diabetes, dyslipidemia, and anticoagulant

INTRODUCTION

The practice of clinical pharmacy is regarded as an imperative part of a health care team to provide the best quality use of medicines. This goal can be achieved by participation in the management of individual patients, incorporation of the best available evidence, and transfer of this knowledge to health care professionals in all practice settings to guarantee the utmost possible quality of patient care.[1]The main objective of this review is to summarize the role of clinical pharmacy services in all facets of cardiovascular diseases (CVD) in hospitalized patients. For the purposes of the present review, databases including MEDLINE/PUBMED and Scopus as well as trial registries were systematically searched from inception through March 2nd, 2012.

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Attempts were made to include all studies reporting the impact of clinical pharmacy services with a focus on an inpatient setting. European studies that involved hospital pharmacists were also included since the number of clinical pharmacists was limited in these countries. The primary outcome measure assessed was the difference between the levels of care in patients receiving pharmaceutical services versus those receiving standard treatment. The results of this search were classified into prevention of drug-related problems, management of cardiovascular risk factors, pharmaceutical care provided for heart failure patients, and anticoagulant management service.

Prevention and Reduction of Episodes of Drug-Related Problems

A known drawback of medications is the untoward events that can occur in the wake of their use.[2-6] these detrimental effects can happen as a result of the inevitable pharmacological properties of medicines or their improper use, which is referred to as medication errors. Medication errors mostly occur in the prescribing process[7] but they are not unavoidable: the fewer medication errors, the less morbidity, mortality, hospital stay, and cost.[8-10] The presence of clinical pharmacists in rounds in tandem with other health care professionals is an effective strategy for reducing the number of preventable adverse events.[11-14] On account of the fact that

cardiovascular medications are the class with the most severe untoward events,[15] it is even more important to have clinical pharmacists participate in cardiology wards. The predominance of errors in cardiovascular medications can be attributed to the fact that the number and complexity of options in this therapeutic class continue to rise.[1] Cooperation between clinical pharmacists and physicians at the time of ordering can both prevent adverse events and help in identifying errors.[12] Clinical pharmacists can help physicians upon prescribing by providing them with detailed information on the pharmacokinetic and pharmacodynamic characteristics of medications such as dosing, interactions, indications, and alternatives based on the patient's situation.[12] To sum up, clinical pharmacists' contribution in cardiac unit rounds or visits is considered to be one of the major fields in which their presence has been proved to be very helpful.

Management of Cardiovascular Risk Factors

Clinical pharmacists play an essential role in the management of patients with chronic diseases. Their mission in optimizing treatment outcomes by increasing the rate of achieving therapeutic goals and decreasing the cost of therapy for both patients and health care settings is believed to be crucial.[16-21]

Hyperglycemia

Hyperglycemia is associated with poor clinical outcomes in patients with any kind of concomitant diseases.[22] Increased mortality is observed in hyperglycemic patients hospitalized in an intensive care unit.[23] Complications of cardiac surgery, including wound infections, is more frequently seen in patients with hyperglycemia.[24, 25] Acute orstress-induced hyperglycemia rather than chronic diabetes is a better predictor of surgery-associated complications and mortality.[26, 27] Irrespective of the reason behind high blood glucose level, hyperglycemic patients with CVD, including those with acute myocardial infarction, arrhythmia, unstable angina, and pulmonary embolism, tend to show increased mortality. The fact that half of patients in cardiac care units may have diabetes[28, 29] adds to the significance of blood glucose level control in those with CVD. Furthermore, some of the medications used in the pharmacotherapy of CVD may induce new onset diabetes.[30] Diuretics, beta blockers, and calcium channel blockers are believed to increase the risk of new onset diabetes.[31-37]Clinical pharmacists' role is even further highlighted in the elaboration and implementation of the protocols for glycemic control, calculation of required insulin dose, monitoring of patients' blood glucose level, and reconciliation of discharge medication.[38] The active presence of clinical pharmacists in the insulin regimen management of hospitalized patients was reported to have reduced length of hospital stay, rate of hyperglycemia, and also hypoglycemic events.[39] Moreover, the inappropriate use of sliding scale insulin regimen without using basal insulin reduced significantly (p value < 0.0001).[39]Clinical pharmacists should, therefore, be present as a team member in the management of hyperglycemia in an inpatient setting in order to furnish the necessary information regarding blood glucose monitoring with a view to bettering patients' clinical outcome. It is deserving of note that fear of hypoglycemia is one of the barriers to adequate blood glucose control; clinical pharmacists' input could help in overcoming this problem.[38]

Hypertension

Proper management of hypertension is of great importance in patients with CVD. Controlling blood pressure can decrease the incidence of myocardial infarction (20-25%) and heart failure (more than 50%).[40] The British Heart Foundation Statistics Database estimated that only 40% of treated hypertensive patients were controlled.[41] The number was the same for the United States, where 37% of hypertensive patients were at their blood pressure goal.[42] Although it seems that limited access to care might be a common reason for poor blood pressure control,[40] Hyman and Pavlik reported that most cases of uncontrolled hypertension occurred in elderly patients who had frequent physician visits.[43] Regular physician visits did not lead to improved control of blood pressure in other studies, as well.[44, 45]The presence of pharmacists to monitor hypertensive patients' use of medications, provide information about potential adverse effects, and avoid drug interactions is encouraged by the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High BloodPressure.[46] Several studies have demonstrated that then corporation of clinical pharmacists in the management of hypertensive patients yields promising outcomes.[47-51] This involvement could have a superior consequence if made in the hospital setting rather than the community (49-53% vs. 96-98%).[52], [53] The discrepancy may be explained by the fact that in community pharmacies, close communication between pharmacists and physicians may not be feasible. A meaningfully positive impact on physicians' prescription of medicines requires face-to-face academic visits between pharmacists and physicians in the practice setting.[54] In a randomized, controlled trial on 95 hypertensive patients having been randomly distributed between a control arm of standard medical care and an intervention arm in which a physician and pharmacist collaborated with each other as a team, the systolic and diastolic blood pressures declined significantly in the intervention arm as compared to those in the control arm (23 vs. 11 mmHg and 14 vs. 3 mmHg),[48] which led to a higher achievement rate of blood pressure goal in the intervention arm. In conclusion, the attendance

of clinical pharmacists as an integral member of a health care team could enhance the rate of blood pressure control and lessen drug interactions and costs for both patients and health care systems. The involvement of clinical pharmacists in the treatment decision-making process at the time of the prescription of medications is advantageous to the management of patients, especially those with chronic diseases. In several hospital settings, physicians' responsibility is to diagnose the disease; whereas in situations where pharmacotherapy is required, clinical pharmacists should select the best choice and monitor patients for clinical response.[47]

Hyperlipidemia

A systematic review of 21 randomized clinical trials, conducted on studies that evaluated the impact of clinical pharmacy services on the screening and treatment of patients with dyslipidemia, revealed that collaborative care involving clinical pharmacists had led to improved outcomes in patients with dyslipidemia.[55] This improved level of care was manifested by better control of total cholesterol, low-density lipoprotein (LDL), and triglyceride.[56] Such success can be explained by the fact that clinical pharmacists play a significant role in making effective drug-therapy selection as well as educating patients regarding dyslipidemia and prescribed medications; this can enhance control and adherence in the long term.[57]In a prospective study, conducted by Bozovich et al., the proportion of patients at their LDL goal at 6 months' follow-up was higher in those enrolled in clinical pharmacist-managed lipid disorders clinic than in the ones having received standard care provided by cardiologists (69% vs. 50%, p value = 0.016).[58] Geber et al. evaluated the level of care provided by clinical pharmacists as opposed to that furnished via standard care by physicians in patients with high baseline LDL[59] and reported a significantly high number of patients who attained their LDL goal among those receiving pharmacotherapy care compared to the ones receiving standard care (p value < 0.001).In brief, collaboration between clinical pharmacists and physicians for the management of patients with dyslipidemia can increase the number of individuals who succeed in achieving their target lipid levels. Therefore, the establishment of such clinical pharmacy clinics should be supported particularly in communities where patients are generally unaware of the role of clinical pharmacists.

Management of Patients with Heart Failure

Patients with heart failure experience frequent hospital admissions due to the progressive and chronic nature of their disease.[60] These frequent hospital admissions may beget changes in patients' drug regimens. Prescription errors or alterations to patients' medications without the provision of sufficient education can result in readmissions.[61,62] Pharmacotherapy management is the main treatment in patients with heart failure; optimizing the pharmacological therapy and encouraging patients' adherence are essential for improving disease management and reducing the rate of hospitalization.[63]Pharmaceutical care provided by clinical pharmacists as members of a multidisciplinary team responsible for patients with heart failure can decrease the risk of hospitalization.[64, 65] Not only can pharmacists' interventions improve patients' adherence but also they can offer them economic assistance by reducing health care-associated costs.[66] Such targets can be achieved by counseling clinical pharmacists before patient discharge.[67] Clinical pharmacists can avoid prescription errors and provide patients with education regarding the medications ordered.[63,67] Moreover, in the care of patients with heart failure after the implantation of left ventricular assist devices, clinical pharmacists are known to have improved drug-therapy issues significantly.[68] These services rendered by clinical pharmacists can bring about a decrease in patients' readmissions and an increase in their quality oflife.[69-71]One of the other approaches that clinical pharmacists can apply to help patients with heart failure is to reduce the rate of discrepancies between prescribed medications in each of admissions and those used previously by reviewing patients' preadmission medication lists.[63] This can be achieved by taking a past medical history of patients upon admission and providing physicians with this information at the time of ordering.[72]In a nutshell, because heart failure is associated with high rates of hospital admissions[73] and clinical pharmacists' interventions can reduce this rate by one third,[64] the presence of clinical pharmacists in the heart failure team is highly recommended.[64]

Anticoagulants Clinic

A clinical pharmacist-managed anticoagulation service is believed to boost the control of patients with respect to therapeutic goals and reduce the rate of adverse effects of anticoagulants as well as the occurrence of thromboembolic events as was attested to by studies that involved trained clinical pharmacists in the management of patients on anticoagulants due to a wide variety of indications and durations using a specialized approach.[74-77] In the Witt et al. study, the level of care provided by clinical pharmacists was compared to that furnished by experienced physicians: patients in the former group showed a statistically significant decrease in anticoagulation therapy and thromboembolic complications.[78] This improved outcome in those enrolled in the pharmacotherapy clinic is due to the greater percentage of time that the patients spent on their therapeutic goals. Clinical pharmacists devise protocols for every single anticoagulant utilized in a hospital setting and define parameters with

which they can initiate, monitor, and adjust anticoagulation therapy in every written protocol. Drawing upon these protocols, clinical pharmacists review and manage each patient's therapy and also evaluate the response on a daily basis.[79]other services that clinical pharmacists can provide for patients on anticoagulant therapy include management of anticoagulants adverse effects, management of anticoagulant therapy in patients before any kind of surgery, and change in the anticoagulant management where necessary. All of these services can be valuable in lessening the complications of anticoagulant management and by extension, health care expenditure.[75, 76]consequently; the superior outcome of anticoagulation management along with a reduction in costs supports the recommendation for a widespread implementation of clinical pharmacists' anticoagulation management.

Other Activities

Clinical pharmacy services are not limited to the above-mentioned activities. Among the ever expanding roles that clinical pharmacists implement in the health care system, therapeutic drug monitoring and managing of patients' pharmacotherapy are of great importance inasmuch as they can significantly improve patient care. Any changes in patients' situations can create alterations to the pharmacokinetic and pharmacodynamic of medications. The presence of clinical pharmacists can be helpful in such circumstances, for these changes normally necessitate modification in drug dosing. Preoperative and postoperative management of patients undergoing cardiac surgery is another area where clinical pharmacists can come to the aid of physicians, not least in determining the optimal time for the cessation and re-initiation of the medications that patients receive before surgery and thus reducing drug-related complications.

CONCLUSION

Cumulative evidence in the existing literature supports the benefits of the presence of clinical pharmacists in a hospital setting, and in particular, in cardiology wards. Clinical pharmacists' participation in medical rounds can be helpful in the prevention of medication errors and their expertise in pharmacotherapy can assist in managing drug therapy based on patient-specific factors. Improvements in patients' safety, level of care, and anticoagulant management in addition to better control of cardiovascular risk factors and reduction in health care costs justify the need for active collaboration between clinical pharmacists and physicians in the management of patients with cardiovascular diseases.

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How to cite this article:
R Siddarama*, T.S. Durga Prasad, R. Rohith, M. Javid Baig, Mallesh Mandha, Ashok kumar.D, M.Venkata subbaiah, Clinical Pharmacy services in cardiovascular disease patients, 6 (2): 2572 – 2578 (2015)