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# Assessing The Impact Of Clinical Pharmacists On Pharmacology-Related Issues In Acute Coronary Syndrome: A Review

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**ABSTRACT**

**"**Acute Coronary Syndrome (ACS)" are more likely to have drug-related problems (DRP) because comorbidities and complications that necessitate taking multiple drugs are frequently present. Drug-related problems (DRPs) may happen at any point during the medication process, from prescription to post-treatment care. Within a multidisciplinary healthcare team, clinical pharmacists are crucial to the treatment of patients with ACS. Medication reconciliation services are offered by pharmacists, according to evaluation. Patient outcomes improve when patients are informed about their medications and given collaborative medication management, particularly during the transition of care. This includes but is not limited to a decline in readmissions and hospitalisations. It is expected that as novel treatments and creative care for ACS patients are introduced, the role of the pharmacist will continue to develop. This evaluation assesses a clinical pharmacist's contribution to the treatment of acute coronary syndrome-related medication problems.

**Keywords:** Drug problem, Acute coronary Syndrome, clinical pharmacist, pharmacology

## 1. INTRODUCTION

Current recommendations recommend aggressive risk reduction to prevent catastrophic cardiovascular accidents because there is a well-established link between lowering cardiovascular disease (CVD) risk factors and improving CVD outcomes. Clinical pharmacists may be helpful in the primary and secondary prevention of CVD, according to a 2017 study by Fawzy et al. A pharmacist can assist a doctor's action by providing more direct interventions (like disease management and educating about medication) in addition to dispensing medications. These approaches can increase drug adherence, produce the desired therapeutic results, and support humanistic control while also encouraging safe pharmaceutical usage. 2568 individuals with coronary heart disease were included in five randomised controlled studies that were the subject of a qualitative analysis by (Cai et al.,2019). Hospitalisations, cardiovascular events, and mortality were the outcomes of one study (421 individuals). Medication compliance, control of blood pressure, and management of lipid profile were the other results in five other investigations (932 patients). Clinical pharmacist interventions have included educating the patient, remarks for medical professionals, medication management, and illness management. The enhanced care did not result in any increases in survival or decreases in

cardiac events or hospitalisations, according to the researchers. However, three studies demonstrated that the pharmacist's involvement had a substantial favourable influence on adherence to medication, control of blood pressure, and management of lipid profile. The results of 59 studies involving individuals who had "coronary artery disease," "heart failure," or "cardiovascular risk factors" were systematically analysed by (Altowarijri et al., 2019). Through the administration of educational programmes, pharmaceutical reconciliation treatments, or a mix of the two, pharmacists have proven they can enhance a range of outcomes. In particular, clinical pharmacists were able to show that their influence is significant in five out of seven randomised controlled investigations that assessed an improvement in cardiovascular morbidity or mortality as their outcomes, whereas two studies showed no impact. The clinical pharmacist may help reduce healthcare costs by improving patient outcomes and risk factor management for cardiovascular disease, according to eight economic studies that the same researchers looked at. Yusuf et al. (2015) study showed pharmacists make excellent members of the healthcare team because they can optimise drug therapy, modify drug dosages, encourage drug adherence, monitor laboratory results, educate patients, streamline regimens, and, when necessary, find less expensive alternatives to medications. Altowaijri and Fitzsimmons (2016) study explored clinical pharmacist involvement in chronic disease management programmes has a positive impact. Although many cardiologists are unaware of the utilisation of a healthcare team strategy, which includes clinical pharmacists, a survey by Adams et al. (2016) indicated that this is not the case. Unfortunately, clinical pharmacists still don't get enough credit for helping patients with ACS. As a consequence, this review focuses on medication pharmacology concerns in patients with ACS. Although patients with acute coronary Syndrome often demonstrate the beneficial effects of drugs, clinical pharmacists play a vital role in addressing these sorts of pharmacology difficulties in disorders related to cardiology. Yet, due to their composition and dosage, these drugs may cause problems in rare circumstances. Clinical pharmacists, therefore, provide effective DRP therapy for patients with ACS.

## 2. A CLINICAL PHARMACIST'S TRAINING AND EDUCATION IN CARDIOVASCULAR PRACTICE

A clinical pharmacist or a group of clinical pharmacists may be tasked with managing a number of medication-related duties that are specific to a given patient. Clinical pharmacists frequently take the lead on regional, national, and even international initiatives aimed at enhancing and optimising medication use systems. The cardiovascular care team will be better able to utilise the clinical pharmacist's function if they are aware of their training, development, applications, and prospective value (Sanjuan et al., 2016).

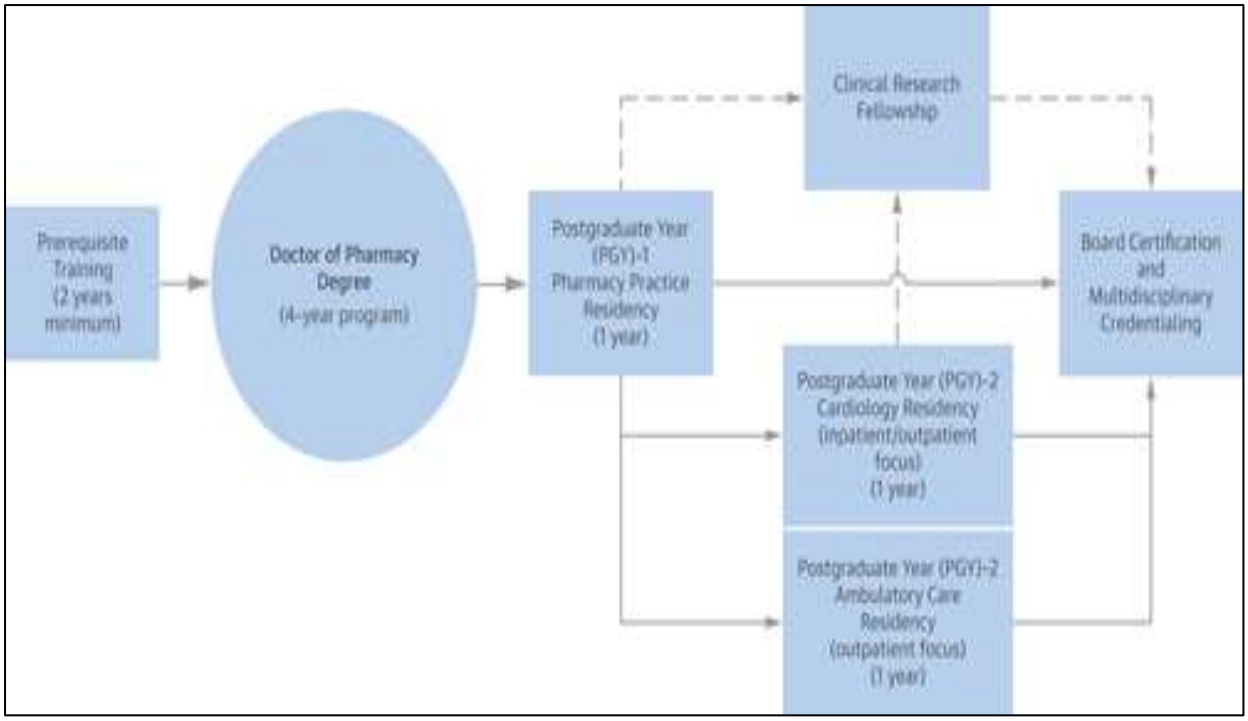


**Figure 1: Flow diagram showing Clinical Pharmacist Education & Training in a Cardiology Practice, Dunn et al., (2015)**

Figure 1 depicts the normal educational path for a clinical pharmacist working in cardiology practice. There are 64 pharmacy schools and colleges in India as of right now, and that number is growing (Ruano et al., 2016). A minimum of two years of undergraduate study is required before enrolling in pharmacy school, though many pupils already hold a bachelor's degree. The majority of pharmacy schools' curricula include a fourth year of experiential learning after three years of didactic study. Graduates receive a "Doctor of Pharmacy (PharmD)" degree. The "National Institute of Pharmaceutical Education & Research (NIPER)" has recently updated that core standards must be met by the designed curricula. The NIPER recommends that interprofessional education be included in curricula to better equip students to deliver patient-centred care. This entails pharmacy students working together with students of different training levels in medicine, nursing, and other health professions to coordinate patient care or educational activities (Amsterdam et al., 2014). Community pharmacies and hospitals serve as the sites for beginning pharmacy practice experiences throughout the first three years of education, while advanced pharmacy practice experiences are done during the fourth and final year of the study. According to the NIPER, these experiences must include providing "direct patient care," "interacting with prescribers," and providing "CPS" with and under the direction of clinical pharmacists.

## 3. CLINICAL PHARMACIST-PROVIDED SERVICES

In this study, Piepoli et al. (2016) covered recent clinical pharmacy services provided to ACS patients, including the following steps:

a) Baseline evaluation: Using patient records and patient interviews, the clinical pharmacist compiles information on each patient's demographics, medication profiles (both prescribed

and over-the-counter), and test findings. The cardiologist is informed of any discrepancy between the patient's drug use and the prescribed medication.

b) Identification of DRP: Through both patient records and patient interviews, a clinical pharmacist can identify a patient's medication-related issues. These issues are then categorised in one of the following groups: "no indication," "needs addition," "low dose," "compliance," "side effects," "administration errors," "wrong drug," and "high dose." The patient interview is followed by a medication review.
c) DRP management: This includes managing DRPs and going over recommendations with the cardiologist at the following appointment before putting them into practice. According to the symptoms of the patient, heart rate, and BP, changing the dosage regimen is indicated. Alternatives are advised if any of the secondary preventive drugs have contraindications in accordance with evidence-based recommendations.
d) Standard medical care includes the release of ACS patients after roughly 15 days. Physical examinations, dietary and smoking cessation counselling, medicine prescriptions, dosage adjustments for cardiovascular medications as necessary, and exercise sessions are all included.

**4. ROLE OF CLINICAL PHARMACISTS ON CLINICAL OUTCOMES AND DRP**

Input factors for the Western healthcare system include drugs significantly. According to Cai et al. (2019), it can be difficult to manage patients when a drug doesn't have the desired impact, and it's common for patients to not achieve their ideal blood pressure, cholesterol, or blood glucose levels when taking medication. Medicines may also have a negative impact on health, leading to higher mortality and morbidity rates as well as lower life expectancy. Drug selection, dose, or patient-related factors, including disease-drug interactions or adherence problems, could all be at blame.

The core competencies of clinical pharmacy include the identification, treatment, and prevention of DRPs. A difficulty related to the drug is an occurrence or scenario involving drug therapy that prevents desirable health outcomes. Steg et al. (2018), in their study research, have classified drug-related issues into various classification systems. These issues primarily relate to "drug selection," "dosages," "adverse drug reactions," "drug interactions," "inadequate monitoring of drug effects/toxicity," and "issues with adherence." DRPs can be speculative or actually occur. Clinical symptoms (such as a rash due to a drug or a reaction) or therapeutic failure due to insufficient dosage are indicators that a serious problem exists. Even while a possible problem may not yet be obvious, if it is not resolved, the patient could experience negative drug-related effects. Examples include giving "Non-steroidal anti-inflammatory drugs (NSAID)" to a patient who has renal failure or giving "erythromycin" to a person who is taking simvastatin or warfarin. Pharmacotherapy that is most economically efficient frequently concentrates on illness prevention.

Prescribers typically accept and carry out the suggestions of clinical pharmacists for treatments to alleviate or prevent drug-related concerns. Between 41% and 96% of applications are reportedly accepted. As evidenced by newly published research from "Denmark, Belgium, Norway, and Sweden", Alsabbagh et al. (2018) also discovered that similar acceptance rates are seen in European countries where the clinical pharmacy is still in its infancy. When pharmacists proposed interventions during the ordering or prescribing process and attended rounds with doctors, the highest acceptance rates were attained (i.e. a proactive approach). The technique adopted, which relied entirely on indirect written

comments during team talks rather than oral notifications (i.e., a reactive strategy), was the cause of the "low acceptance rate" discovered by (Allende et al.,2016). A poor acceptance rate (47%) was discovered in a different study by Van et al. (2019), which is also accounted for by the pharmacist's limited access to patient-specific data. Maher et al. (2018) included 14 randomised controlled studies, and clinical pharmacist interventions decreased the likelihood of drug-related issues in elderly patients. To test cost-effectiveness, however, there is still a need for sizable multicenter studies. Clarifying the clinical relevance of drug-related concerns found by the clinical pharmacist is intriguing. Even though the ranking system for clinical importance varies between research, most of the interventions are of significant clinical value for the patient. The incidences of drug-related issues have dramatically decreased owing to clinical pharmacists, which signals improved patient pharmacotherapy. Clinical pharmacists recognise clinically important drug-related issues, propose solutions, and prescribers approve the solutions. The main way to gauge how well interventions are working on patients is to look at how often these issues occur.

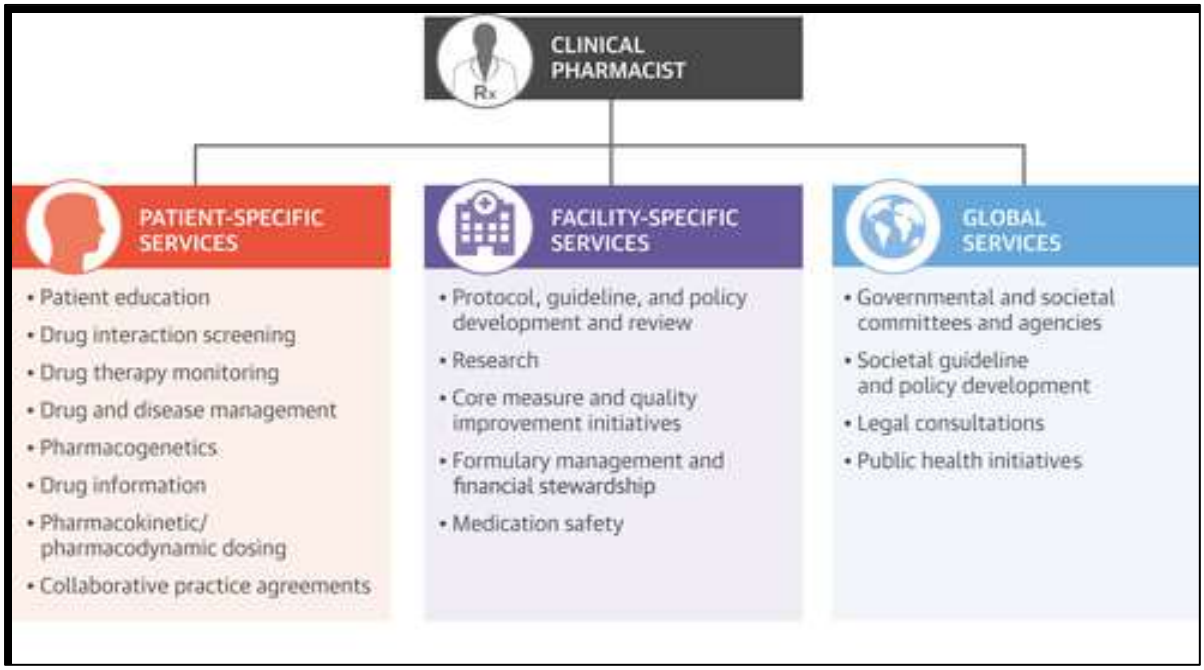


**Figure 2: Diagram illustrating the role of clinical pharmacists in CVD, Dunn et al., (2015)**

Clinical pharmacists also play a significant part in assuring the safety of drugs, either by implementing specific pharmaceutical treatments or by creating macro processes to reduce medication-related mistake risk, as shown in Figure 2. Cardiovascular drugs were the "third-most frequently prescribed class of medications," according to Peter et al. (2016), who conducted the "MEDAP (Medication Error Detection, Amelioration, and Prevention)" study, an "observational analysis of clinical pharmacists involved in patient safety initiatives." These errors required pharmacist intervention. The deep knowledge of the usage process of medication and clinical pharmacology that clinical pharmacists possess places them in a unique position to address pharmaceutical safety, according to Dunn et al. (2015).

## 5. PHARMACOLOGY DRUG USED FOR TREATMENT OF ACS

Milfred et al. (2013) study found that clopidogrel and acetylsalicylic acid (ASA) are two antiplatelet medications that have been authorised for the long-term treatment of CAD in Germany and other nations. Rodgers et al. (2019) study found that if 100 people with ACS take ASA over the course of five years, about 2 to 3 of them will experience bleeding that necessitates medical attention. However, the majority of these cases are treatable and don't have any lasting consequences. A proton-pump inhibitor is a drug that is frequently prescribed in addition to ASA to someone who has experienced more severe bleeding. This medication helps to prevent stomach ulcers by defending the stomach's mucous lining. The influence of aspirin and clopidogrel on the risk of major bleeding episodes in ACS patients is highlighted by a 2015 study by Yusuf et al. Combination medication decreases the likelihood of major cardiovascular events, myocardial infarction, or stroke compared to single pharmacological therapy, but it dramatically increases the risk of major bleeding events. To solve drug-related problems, pharmacists recommend "proton pump inhibitors (PPIs)" such as "omeprazole" and "esomeprazole," which may diminish the effect of clopidogrel. If you have indigestion and want stomach protection, the doctor may give lansoprazole or another PPI.

Statins are medications that lower specified levels of blood cholesterol (cholesterol-lowering drugs). Nevertheless, the benefits of statins extend beyond simply lowering cholesterol levels. According to Ware's (2017) research, although statin therapy may be beneficial for certain people with a "10-year Cardiovascular disease event risk of less than 10%, the likelihood of benefit is lower due to a lower likelihood of disease and uncertainty in personal risk prediction." Clinicians may decide to recommend a "low- to moderate-dose statin" to a specific group of people who do not have a history of cardiovascular disease when each of the following conditions is satisfied: 1) they range in age from 40 to 75.; 2) they have a risk factor for Cardiovascular disease or more (for example, diabetes, dyslipidaemia, hypertension, or smoking); and 3) they are predicted to have a 7.5% to 10% 10-year risk of experiencing a cardiovascular incident. Although there were no serious side effects from the statin medicine, pharmacists advise against using it for severe ACS patients until more evidence of its safety and usefulness is available.

Selim et al. (2016) studied that beta blockers lower heart rate, which reduces the pressure on the heart. The two most commonly used are metoprolol and bisoprolol. The average metoprolol dose is 50 to 100 mg per day, whereas the typical "bisoprolol" dose is "2.5 to 5 mg" per day. Both "Metoprolol" and "Bisoprolol" may exacerbate heart failure symptoms in some patients. Symptoms like dilated neck veins, chest pain or discomfort, irregular heartbeat, extreme exhaustion, difficulty breathing, swelling of the face, feet, fingers, or lower legs, or weight gain are all signs of drug-related issues. Pharmacists usually handle this by lowering the dose or switching to a selective beta blocker. If troubles with beta blockers arise, there are other medications available. Other medications that slow the heart rate, such as diltiazem or verapamil, may be substituted if you have angina or AF.

## 6. EFFICACY OF PHARMACIST INTERVENTION IN CARDIOVASCULAR DISEASE MANAGEMENT

Inconsistent results have been found in the numerous studies that have assessed pharmacists' contributions to the treatment of patients with ischemic heart disease. This, it is claimed, results from the few studies that have been carried out thus far and the few participants in each study. Despite the fact that studies consistently demonstrate and affirm the critical role played by the pharmacist in enhancing these patients' medication adherence, the "impact of pharmacist care" in connection to

"secondary prevention of morbidity" and death is yet unknown. 2568 patients with coronary heart disease from five randomised controlled studies were qualitatively examined (Ware, 2017).

Mortality, cardiovascular events, and hospitalisations were the outcomes of the Allende et al. (2016) study, which involved 421 participants. Medication compliance, lipid management and blood pressure control were the other results in five other investigations (932 patients). Pharmaceutical interventions have included "patient education," "feedback to healthcare providers," "drug management," and "disease management." The authors were unable to show that care provided by pharmacists improved survival or reduced cardiac events and hospitalisations. Yet Selim et al. (2016) found that the pharmacist's intervention significantly improved medication adherence, blood pressure control, and cholesterol management. Fifty-nine trials with individuals with "coronary heart disease," "heart failure," or "cardiovascular risk factors" were systematically reviewed (Melo et al., 2016). A pharmacist's engagement proved the ability to improve various outcomes through the offering of educational initiatives, medication reconciliation approaches, or a combination of the two. In particular, clinical pharmacists were able to show that their influence is significant in five out of the seven randomised controlled investigations that examined an improvement in cardiovascular morbidity as their outcomes, whereas two studies showed no benefit. Heart failure is the ideal target for a multidisciplinary approach, claim Hassan et al. (2013) because it greatly contributes to morbidity and mortality globally. There has been a lot of research done on the role of the pharmacist in treating heart failure patients. Using a variety of outcome measures, these studies analysed services provided in a range of venues, predominantly hospitals. The success of the pharmacist's intervention in terms of shorter hospital stays and fewer readmissions is well supported by a sizable body of research, in contrast to other cardiovascular diseases and disorders. Additionally, after the pharmacist's educational initiatives were put into place, patients with heart failure showed improvements in their overall wellness and self-perception of well-being. In the first systematic review by Amsterdam et al. (2015), the "prognostic impact of pharmacy services on post-discharge heart failure patients" was investigated. Six out of the seven studies included had favourable results, such as "lower rates of unplanned hospital readmissions," "lower death rates," and "higher compliance and medication knowledge," were exposed.

Piepoli et al. (2016) examined the effectiveness and "influence of pharmacist interventions on adherence in patients with heart failure," revealing a benefit that was transient once the intervention was over. The study found that in order to maintain the gains made, pharmacist interventions must be a part of a multidisciplinary system of care that begins at discharge, involves human contact, and is maintained indefinitely. Also, it evaluated and provided a list of specific variables linked to drug adherence for heart failure. A hospital pharmacist who followed elderly patients with heart failure after discharge may be able to significantly improve treatment results, "decrease hospitalisations and readmissions," and "improve patients' overall assessments of their own health," according to a study by O'Gara et al. (2016).

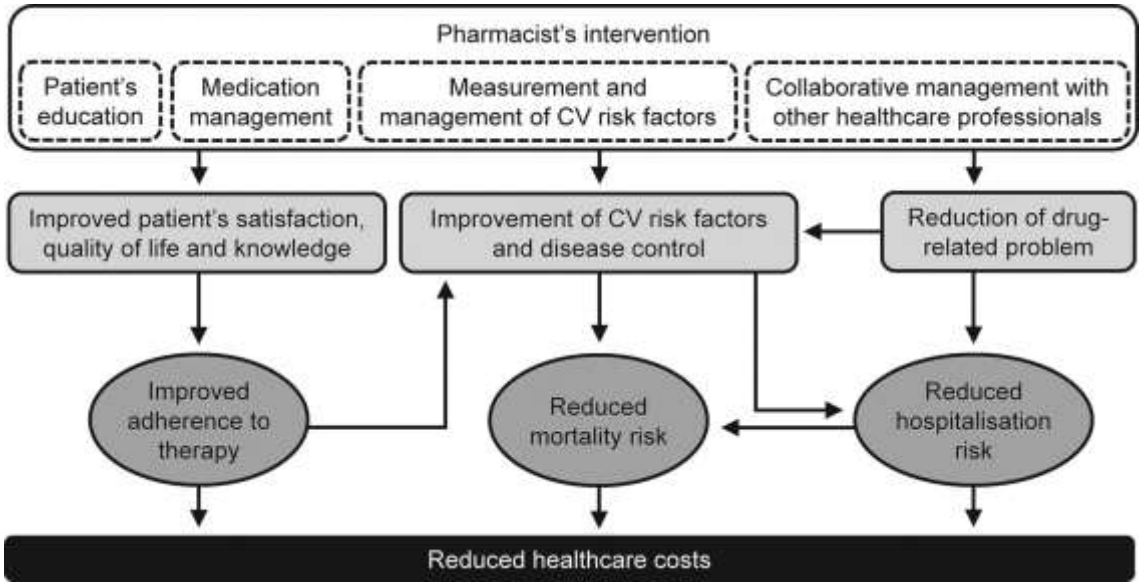


**Figure 3: Humanistic, Economic and Clinical effects of pharmacist intervention with CVD patients. Omboni et al., (2018)**

## 7. FUTURE CHALLENGES

Although the most frequently employed interventions in the pharmacy context right now are patient education and medication management, there is a growing need for additional services. Instead of sophisticated therapy, which might be influenced by a number of unidentified confounders and result in an uncertain outcome that is only partially useful to the patient, these services ought to be concentrated on fundamental interventions. These procedures ought to be based on what the patient would typically receive from a pharmacist. Future studies should assess the quantitative and qualitative impacts of chemical therapies on the main chronic diseases and pinpoint the precise areas where the collaborative practice has an impact. Because the evidence indicates that pharmacist interventions are more successful in high-risk or complex patients, investigations ought to be sizable, both in specimen "size and length of follow-up," controlled and randomised, and therefore should examine different types of outcomes in the studied population. Due to the accessibility and distribution of community pharmacies as well as the ongoing interactions that these professionals have with patients and other healthcare administrators, community pharmacists should be given preference in these investigations. The gradual adoption of health information technology, particularly telemedicine, in pharmacies and primary care settings may open up new channels of communication and electronic information sharing between patients and their healthcare team regarding medications, lifestyle choices, and patient health status. The implementation of telemedicine will make it easier to identify individuals who are at risk for CVD as well as to quickly and accurately provide feedback and modify care plans for patients who have already received therapy. This is accomplished by encouraging a closer and more productive working connection between pharmacists and physicians through the use of collaboration agreements.

## CONCLUSION

The current study explores how clinical pharmacists can significantly impact the management of "ACS" by regulating and avoiding "DRPs" and recommending lifestyle changes that enhance health and lower the risk of CVD. Clinical pharmacist services were provided to patients with ACS, and they reported

improved quality of life, adherence to treatment plans, and most clinical indicators. To confirm the effectiveness of clinical pharmacist services in the treatment of “ACS” patients, larger, more cost-effective multicenter studies are needed. Among ACS patients, DRPs are quickly identified and successfully managed by the clinical pharmacist. Clinical pharmacist interventions were generally well received, and this led to a beneficial resolution of DRPs and an improvement in patient outcomes.

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