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# REVIEW ON THE ROLE OF THE PHARMACIST IN THE TREATMENT AND PREVENTION OF CARDIOVASCULAR DISEASE

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**Abstract:**
*At any age, including in childhood, there are a variety of risk factors that might lead to cardiovascular disease (CVD). You can put off or even stop the onset of cardiovascular disease risk factors by adopting a healthy lifestyle. By assisting with patient education and counseling, managing drug safety, reviewing, monitoring, and reconciling medications, identifying and controlling specific cardiovascular risk factors (such as blood pressure, blood glucose, and serum lipids), and clinical outcomes, pharmacists may play an important role in primary and secondary prevention of cardiovascular diseases. Research has shown that when pharmacists are involved, patients with heart failure have better management of their hypertension, dyslipidaemia, or diabetes, are more likely to quit smoking, and have fewer hospitalizations. Economic and humanistic outcomes (such as patient happiness, adherence, and knowledge) have scant evidence of efficacy. It would appear that the most contemporary and effective method of providing healthcare is through a multidisciplinary strategy that incorporates medical expertise with that of a pharmacist, specialty nurse, or both, with a stronger emphasis on community pharmacists as opposed to hospital pharmacists. If we want to know how collaborative practice affects cardiovascular disease and how pharmacists may help reduce it, we need more studies that are both quantitative and qualitative. The sensitivity to the intervention of community pharmacists should be the primary focus of such study. It is reasonable to assume that interventions offered in a community setting will have the greatest impact due to the widespread availability of pharmaceutical services.*

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## INTRODUCTION:

Nearly 17.9 million people die every year from cardiovascular diseases (CVDs), making them the top killers on a global scale. Coronary artery disease, rheumatic heart disease, cerebrovascular disease, and other similar ailments are all part of the cardiovascular disease (CVD) umbrella. Heart disease and stroke account for almost 80% of all cardiovascular disease fatalities; for those under the age of 70, a third of these deaths occur before their expected lifespan. Dangerous alcohol consumption, sedentary lifestyle, cigarette smoking, and poor nutrition are the leading causes of cardiovascular disease and stroke. Individuals may experience an increase in blood pressure, blood glucose, blood lipids, and overweight or obesity as a result of behavioral risk factors. These "intermediate risks factors" can be assessed in primary care settings and show a higher probability of cardiovascular problems such as heart attacks, strokes, and heart failure.

Reduce your risk of cardiovascular disease by quitting smoking, cutting back on salt in your diet, increasing your intake of fruits and vegetables, getting regular exercise, and cutting out dangerous alcohol usage. In order to encourage individuals to start and maintain healthy habits, health policies should be crafted to make healthy options more accessible and inexpensive.

To avoid untimely demises, it is necessary to determine who is most vulnerable to cardiovascular diseases and make sure they get the care they need. It is crucial that all primary health care facilities have basic health technology and medications for noncommunicable diseases so that individuals who need it can get treatment and counseling. In order to avoid serious cardiovascular accidents, current guidelines advise a vigorous reduction of risk factors for cardiovascular disease because of the well-established correlation between these variables and better cardiovascular disease outcomes.[1] Primary and secondary prevention of cardiovascular diseases may involve the pharmacist. To supplement the efforts of doctors, pharmacists can do more than just dispense medication; they can also educate patients about their medications and help them manage their diseases. This all works toward the common goals of better medication adherence, better therapeutic outcomes, safer medication use, and more humanistic control. [2] Several diseases and conditions, such as diabetes, dyslipidaemia, arterial hypertension, obesity, asthma, COPD, infectious diseases (including influenza vaccination), mental health issues, and osteoporosis prevention, have shown promising therapeutic and safety outcomes when patients' care is directly intervened with by pharmacists rather than through conventional means.[3–5] Clinical pharmacy services aimed at particular cardiovascular diseases, like hypertension or diabetes mellitus, have a good effect on patient outcomes, according to a new study of systematic reviews. These results include lower blood pressure and hemoglobin A1c levels.[6] Studies found conflicting and inconsistent effects on quality of life, patient knowledge, patient satisfaction, and adherence, among other humanistic outcomes.

With these foundations laid, the purpose of this review is to bring the reader up-to-date on the current services that pharmacists can offer to aid in the management of patients suffering from cardiovascular disease or at risk for developing this condition. We will also go over the possibilities and viewpoints for developing suitable healthcare delivery models, as well as the real advantages of such treatments, in light of the present evidence from randomized or observational research. Since models based on a multidisciplinary approach are the most well-liked and widely-accepted by doctors around the world, that is where this review will mostly concentrate its attention.

The heterogeneity of settings (hospital, outpatient clinic, and community) and outcomes, along with the abundance of studies of varying quality, led us to choose to provide the results of large, well-conducted meta-analyses that have recently appeared in the literature.

## PHARMACY SERVICES FOR PATIENTS WITH CARDIOVASCULAR DISEASE

An old-fashioned pharmacist's duties include advising patients on how to best take their medications, as well as providing information on diseases and non-pharmacological treatments (such as healthy lifestyle choices). These programs are designed to help patients learn more about their conditions, how to take their medications correctly, stay on track with their treatment plans, and maintain their health. In addition to dispensing medication, the pharmacist is responsible for evaluating patients for potential drug safety issues, offering detailed advice, and reporting any problems to the attending physician. However, this paper will address and explain in detail the possibility of a multidisciplinary team approach, which is likely to be the most exciting, successful, and beneficial activity that a pharmacist may undertake. The pharmacist has the authority to independently manage medications in accordance with established clinical protocols or collaborative agreements with the

doctor as part of a team-based multidisciplinary service that also includes reviewing and adjusting drug therapy, creating or refining a comprehensive and accurate medication history, and therapeutic reconciliation after hospital discharge and subsequent follow-up. Particularly intriguing is the idea of establishing organized programs to identify, avoid, or manage certain risk factors. These programs should include monitoring blood pressure, glucose levels, and lipids, as well as offering diagnostic tests with medical reporting, like 12-lead resting electrocardiograms, 24-hour ambulatory blood pressure monitoring, or 24-hour electrocardiogram Holter monitoring, through telemedicine tools in conjunction with medical reporting service providers. In modern practice, hospital pharmacists tend to offer more complex interventions, such as those involving the application of clinical guidelines and dosage adjustment and titration, while community pharmacists tend to focus more on improving patient knowledge and compliance, and eventually on monitoring the outcomes of some patients. Home visits to critically ill or fragile patients are occasionally the responsibility of the community pharmacy pharmacist working under the supervision of a primary care outpatient clinic.

## EFFECTIVENESS OF THE PHARMACIST'S INTERVENTION IN DIVERSE CARDIOVASCULAR CONDITIONS

The impact of pharmacists' direct and indirect care for patients with cardiovascular disorders has been the subject of multiple systematic reviews in the past ten years. We looked for articles that addressed this topic in the medical literature and found a mix of randomized controlled trials and observational studies that either focused on a single site or combined interventions from many locations (e.g., community clinics, outpatient centers, and hospitals). Table 1 summarizes the results of these meta-analyses, and the following sections will go into further depth on the topic.

## PATIENTS WITH MULTIPLE RISK FACTORS FOR CORONARY DISEASE

Early research on the effectiveness of pharmacist interventions in lowering coronary heart disease risk factors and risk behaviors mostly focused on community pharmacy-based initiatives. A comprehensive review that included 9 trials and 4091 high-risk individuals for coronary heart disease found that pharmacists significantly helped people quit smoking and played an essential influence in

controlling their lipid levels.[9] The authors noted that additional research was needed in this area because these benefits were only seen in a small number of randomized controlled trials. In a comprehensive analysis of 30 randomized controlled trials, Santschi et al.[10] found that when pharmacists were involved, blood pressure, total cholesterol, and low density lipoprotein (LDL) cholesterol all decreased significantly. Additionally, the risk of smoking was reduced, and in some cases, the pharmacist and physician worked together to provide direct care. Clinical pharmacy services provided in primary care general practice clinics were the focus of 17 research studies analyzed by Tan et al. The pharmacist's involvement, which primarily includes reviewing medications and may or may not include other activities carried out in collaboration with the family physician, led to notable decreases ($P<0.05$) in blood pressure (5.7 (7.1 to 4.3) mm Hg for systolic and 3.5 (4.4 to 2.6) mm Hg for diastolic), hemoglobin A1c (0.9 (1.2, 0.6) %), LDL-cholesterol (18.7 (34.1 to 3.4) mg/dL), total cholesterol (32.0 (54.9 to 9.1) mg/dL), and 10-year Framingham risk score (1.8, 3.7 to 0.0) %). In a more recent review, Brown et al.11 compiled 24 papers on pharmacy-delivered interventions; the majority of these studies dealt with nicotine replacement therapy and behavioral support for smokers trying to quit. The odds ratio (OR) for smoking cessation among the 9714 participants was 1.85 (1.125 to 2.75), indicating that the interventions were effective and cost-effective in helping individuals quit smoking, especially when compared to normal care. When compared to other primary care settings, pharmacy-based weight reduction therapies were equally beneficial, but they were neither as effective nor cost-efficient as community-based weight management services offered by private companies. Glycaemic control, lipids, and blood pressure were found to significantly improve in the five trials that compared usual care with multicomponent interventions (pharmacotherapy and lifestyle changes) in individuals with comorbidities (diabetes mellitus, dyslipidaemia, and hypertension). The lack of studies meant that a quantitative meta-analysis was not possible. In conclusion, the aforementioned meta-analyses suggest that pharmacy services can reduce major cardiovascular risk factors and help people lead healthier lives, which reduces the likelihood of cardiovascular disease. One thing that all assessments have in common, though, was how different the research were from one another.

### Hypertension
A recent literature review found that when particular medical conditions like hypertension or diabetes were

taken into account, the best results were observed. The review looked at 520 articles published in the last 40 years and reported 439 randomized controlled trials evaluating clinical pharmacy services.

When it comes to hypertension, studies have shown that when pharmacists get involved, offering education and taking blood pressure readings, patients are better able to regulate their blood pressure and are more likely to stick with their antihypertensive treatment plans.[12] found the intervention by the pharmacist resulted in a considerably higher decrease ($19.4\pm3.5$ mm Hg) in both systolic and diastolic blood pressure ($8.8\pm2.9$ mm Hg) compared to the control group ($11.3\pm4.2$ and $4.9\pm3.0$ mm Hg, respectively) (P<0.001). Additionally, 62.8% of the intervention group and 32.6% of the control group were able to keep their blood pressure under control. Notably, medication adherence was shown to be much higher in cases where the intervention resulted in a large decrease in blood pressure. A recent meta-analysis was conducted with 39 randomized controlled trials and 14,224 patients. The results showed that when the pharmacist was involved, blood pressure reductions were higher than with usual care. The effect was even larger when the pharmacist was the one leading the intervention (9.1/4.5 mm Hg vs 6.7/1.9 mm Hg less than once a month) and when the intervention was led by the pharmacist (8.5- and 4.6-mm Hg vs 6.3- and 2.8-mm Hg under collaborative care).[15]

The meta-analysis conducted by Machado et al.13, which included 2246 patients from 13 studies, found that after the pharmacist's intervention, systolic blood pressure decreased by $10.7\pm11.6$ mm Hg (P=0.002), while it stayed the same in the standard care group ($3.2\pm12.1$ mm Hg, P=0.361). Additionally, after the pharmacist's intervention, systolic blood pressure decreased by $6.9\pm12.1$ mm Hg (P=0.047), compared to the controls. The two most common therapies were hypertension education (68%) and medication management (82%). When looking at diastolic blood pressure, treatment adherence (five out of three studies showed a significant effect), and quality of life (one out of eight studies showed a significant effect), this meta-analysis found no significant influence from pharmacist involvement. With 2619 patients included across 8 trials, Morgado et al.14] conducted another meta-analysis and discovered Community pharmacist-led interventions were found to significantly lower systolic blood pressure (6.1 (3.8 to 8.4) mm Hg) and diastolic blood pressure (2.5 (1.5 to 3.4) mm Hg) compared to usual care, as shown in 16 randomised controlled trials. This suggests that

these interventions contribute to better clinical management of hypertension. Systolic blood pressure difference: 1.9 (-3.1 to -6.9) mm Hg and diastolic blood pressure difference: 1.5 (-0.4 to -3.4) mm Hg; P=0.460 and 0.127, respectively) showed a non-significant trend for a smaller blood pressure reduction from community pharmacists' interventions in patients with cardiovascular comorbidities compared to those without comorbidities. The adherence rate was higher in the group that received the intervention (OR 12.1 (4.2 to 34.6), P<0.001). It is possible that community pharmacies would be the best places to launch hypertension self-screening programs in the community. In a systematic review and meta-analysis by Fleming et al.17, 73 studies detailed screening in 9 different contexts; the most common of these was pharmacies (22% of studies), followed by public or retail locations (15%). Despite significant study-to-study variation, the authors did find that 39% of hypertension patients were diagnosed in community pharmacies. Although the reviewers did find that there is a weak evidence base for the effectiveness of community blood pressure screening by non-physicians in detecting raised blood pressure, they were able to show that the rate of screened participants with raised blood pressure was larger in the pharmacy setting compared to other sites.

**Dyslipidemia**

There were two meta-analyses that looked at hyperlipidaemia patients and found that the pharmacist's intervention improved some health outcomes, but not all. Despite modest heterogeneity revealed by both systematic studies, the most notable effect was on total and LDL cholesterol. Education was the most prevalent intervention in the included studies, followed by medication therapy recommendations and evaluation of adherence. The pharmacist's intervention was linked to a $34.2\pm10.3$ mg/dL decrease in total cholesterol, which was further reduced to $22.0\pm10.4$ mg/dL when compared with the control group, in the systematic review of Machado18, which included 23 studies and 2343 patients (P<0.001). In addition to lowering total cholesterol and HDL cholesterol levels, the pharmacist's intervention also reduced triglyceride and LDL cholesterol levels. However, this additional reduction was not statistically significant when compared to the control group's levels ($17.5\pm10.9$ mg/dL P=0.109 for HDL cholesterol and $21.8\pm24.2$ mg/dL P=0.368 for triglycerides). patient-reported outcomes, adherence, and quality of life were unaffected by the pharmacist's intervention, nor was high density lipoprotein (HDL) cholesterol ($0.5\pm4.8$

mg/dL,                                      P=0.910).
With 5416 patients randomized to receive either normal care or improved pharmacist care, Charrois and colleagues19 analyzed 21 randomized controlled trials. In the 9 studies that reported this measure, the intervention group had a substantially reduced mean LDL cholesterol level (primary outcome measure) of 10.7 (16.9, 4.6) mg/dL at the conclusion of the follow-up period in this meta-analysis (P<0.01). In the enhanced pharmacist care group, total cholesterol levels were 15.2 (24.0 to 6.4) mg/dL and triglycerides levels were 23.0 (37.2 to 8.9) mg/dL, respectively, which was significantly lower (P<0.01) compared to the other groups (10 studies). Nevertheless, there was a great deal of variation in the outcomes of these evaluations. When looking at HDL cholesterol (+0.4 (1.9 to +2.3) mg/dL), there was no discernible impact of the intervention. It is worth noting that this meta-analysis compared subgroups of collaborative care with those of independent practice (pharmacist led) as its main result. The difference between the two did not reach statistical significance, however the latter had a 10.7 mg/dL higher effect on LDL cholesterol than independent care. Lastly, compared to patients getting standard care, those receiving enhanced pharmacist care had a higher odds ratio (OR) and 95% confidence interval (CI) for reaching target cholesterol levels. either to alter their cholesterol-lowering treatment (1.82; 1.09 to 3.06; five studies) or to have a lipid panel ordered or suggested by a pharmacist during the trial (2.02; 1.30 to 3.24; eight studies).

**Diabetes**
Across a variety of contexts and research methods, studies involving adults with diabetes found that different interventions from pharmacists improved glycaemic control (haemoglobin A1c). Compared to strategies that included pharmacists for medication reviews and illness education only, strategies that included pharmacists for direct medical management saw the most improvement. In a qualitative meta-analysis involving 3,981 people with diabetes, Wubben and Vivian20 combed through 21 trials (9 randomized controlled trials, 1 controlled clinical trial, and 11 cohort studies). Extra visits by pharmacists with broader responsibilities to care for adult diabetic patients were a component of all strategies. Overall, hemoglobin A1c improved across a variety of contexts and research designs, with variations in change ranging from a 0.2% increase to a 2.1% decrease. Furthermore, the same authors proved that prescribing pharmacists significantly enhance glycemic control in diabetic patients. In fact, when pharmacists were able to administer antidiabetic medicines under physician supervision, hemoglobin

A1c improved by 1.0% compared to the control group, whereas it improved by just 0.5% without this authority (P=0.007). The economic evaluations of two trials also pointed to a trend toward a reduction in the disease's long-term expenses through better glycemic control.

After pharmacists' intervention, diabetics showed a notable decrease in hemoglobin A1c levels (1.0%±0.3%), compared to controls (0.3%±0.3%), as shown in another meta-analysis of 30 trials involving 2247 patients, which was statistically significant (P<0.001).21 Medication dose adjustment (61%) and diabetes education (69% of cases) were the most common interventions. Diet, exercise, pharmacological therapy, and disease-specific instructions were provided verbally. While fasting plasma glucose and systolic blood pressure showed a potential therapeutic benefit, treatment adherence, changes in lipid levels, knowledge, and quality of life did not show any sensitive outcomes in the same meta-analysis.
Recent meta-analysis of 40 studies (11 randomized controlled) found no evidence that community pharmacist intervention improved major health outcomes.[22] Education and follow-up were examples of patient-directed interventions in the research, while the most prevalent physician-directed intervention was the detection of drug-related issues and the offering of treatment advice. Regrettably, research seldom met quality standards and often evaluated solutions that seemed to require a significant amount of effort. What makes this review unique is that it included diabetics with other cardiovascular risk factors or diseases and concentrated on interventions relevant to community pharmacists, which is different from past meta-analyses.

**Coronary heart disease**
Various research have examined the role of pharmacists in the care of patients with ischemic heart disease, however the findings have been contradictory. This is supposedly due to the small sample sizes used in these studies. The influence of pharmacist treatment on secondary prevention of morbidity and mortality is still unknown, however data consistently show that pharmacists play a crucial role in improving medication adherence among these patients. A qualitative review of five randomized controlled trials including 2568 individuals with coronary heart disease was presented by Cai et al.[23] One study included 421 patients and found that medication adherence was the outcome; two studies included 1914 patients and found that blood pressure was the outcome; and three studies included 932 patients and

found that lipid control was the outcome. Educating patients, managing medications, providing input to doctors, and managing diseases were all areas in which pharmacists were involved. No improvement in survival or decrease in cardiac events or hospitalizations due to pharmacist care could be demonstrated by the authors. Nevertheless, three trials demonstrated significant favorable effects of pharmacist intervention on medication adherence, one study on blood pressure control, and one study on lipid management.

A comprehensive analysis of 59 trials involving individuals with coronary heart disease, heart failure, or risk factors for cardiovascular disease was carried out by Altowarijri et al.[24]. By providing educational intervention, medication management intervention, or a mix of the two, pharmacists have shown a capacity to enhance various outcomes. Particularly, five out of seven randomized controlled trials that examined the impact of clinical pharmacists on cardiovascular morbidity or mortality found a substantial effect, whereas two studies found no effect. By analyzing eight economic studies, the same authors showed that clinical pharmacists can help lower cardiovascular disease risk factors and improve patient outcomes, which in turn can reduce healthcare costs.

### Heart failure

The population is getting older and better at treating acute cardiovascular events, which is leading to an increase in the prevalence of heart failure, a major public health concern.[25] A multidisciplinary approach is excellent for attaining effective therapy of heart failure, which accounts for major morbidity and mortality worldwide. The pharmacist's important involvement in the treatment of heart failure patients has been shown in a number of studies. These research looked at a range of services, their scopes, locations (mostly hospitals), and outcome measures. There is a substantial amount of research showing that the pharmacist's assistance can effectively decrease hospital stays and readmissions, which is different from other cardiovascular diseases and disorders. Moreover, when the pharmacist has undertaken educational efforts, patients with heart failure report an improvement in their well-being and general assessment of their own well-being.

Ponniah et al.[26] published the first systematic review to examine the predictive value of pharmacy services for heart failure patients after discharge. Positive results, such as reduced rates of death and unplanned hospital readmissions, improved medication adherence, and increased knowledge of the patient's medication were shown in six out of seven trials. Researchers Koshman et al.[27] found 12 randomized controlled trials that linked pharmacist care to lower rates of hospitalization for all causes (OR and 95% CI 0.71 (0.54 to 0.94)) and heart failure (0.69 (0.51 to 0.94)). However, they found no significant association between pharmacist care and lower rates of mortality (0.84 (0.61 to 1.15)). The rate of heart failure hospitalization was also reduced by 0.42 (0.24 to 0.74) with pharmacist collaborative care, compared to 0.89 (0.68 to 1.17) with pharmacist-directed treatment (P=0.020).

Patients with heart failure showed an improvement in adherence when pharmacists intervened, but this effect did not last after the interventions ended (Davis et al., [28]). Researchers found that patients were more likely to take their heart failure medication as prescribed when they were part of a multidisciplinary team that began working together upon discharge and maintained constant, one-on-one communication between the patient and pharmacists. The probability of unexpected hospital readmission was considerably reduced (P<0.01) by interventions provided by a hospital pharmacist who followed older patients with heart failure after release (95% CI 0.75, 0.59 to 0.95). Pharmaceutical interventions centered on medication reconciliation, patient education, and collaborative medication management have the potential to improve patients' sense of self-worth, reduce hospitalizations and readmissions, and effect positive changes in therapeutic outcomes, according to a meta-analysis of thirteen large studies.30 In a recent meta-analysis of 14 randomized controlled trials, Kang et al.31 confirmed that hospitalization for any reason (OR and 95% CI 0.74, 0.58 to 0.94) is significantly reduced in patients with heart failure and coronary heart disease who receive pharmacy services. However, they did not find any reduction in all-cause mortality (1.04, 0.89 to 1.21) or hospitalization related to heart problems (0.90, 0.78 to 1.03). In addition, the intervention group had a noticeably higher prescription rate for ACE inhibitors (1.43; 1.07 to 1.91) and beta-blockers (1.92; 1.24 to 2.96), with a significance level of P<0.05. As a result of variations in pharmaceutical treatment, patient populations, and clinical settings, the evidence for additional intervention strategies was weak or nonexistent.

### POSSIBLE BENEFITS OF PHARMACIST'S INTERVENTION INPATIENTS WITH CARDIOVASCULAR DISEASE

Pharmacists are in a unique position to help patients and doctors succeed in their treatment plans because of their accessibility and the proper contact and

collaboration they can offer. Although not all patients with cardiovascular risk factors or diseases achieved excellent outcomes, it was shown that pharmacist engagement from screening patients all the way to drug commencement and follow-up was critical.

Clinical outcomes are improved when major cardiovascular risk factors like hypertension, dyslipidaemia, diabetes, or smoking cessation are managed with pharmaceutical interventions, according to randomized controlled and observational studies. This is also true for heart failure. Some research did find that pharmacists could increase humanistic outcomes including patient happiness, adherence, and knowledge; however, this was not the case for all trials. While there is some evidence that pharmacist-directed care, such as measuring cardiovascular risk factors or making prescription modifications in conjunction with the treating physician, can have a positive impact, numerous randomized controlled trials have shown mixed results.

provides a synopsis of the potential benefits of pharmacist intervention for individuals with preexisting cardiovascular disease or high risk of cardiovascular disease.

There may be multiple, interconnected ways in which a pharmacist's intervention helps a patient with cardiovascular disease

Interprofessional collaborative practice, patient education, medicine management, direct measurement and management of cardiovascular risk factors (e.g., blood pressure, glucose levels, and serum cholesterol), and patient satisfaction may have an effect on humanistic, clinical, and economic outcomes. Cardiovascular risk factors and diseases, hospitalization, treatment adherence, adverse drug reactions, and medication errors are examples of clinical outcomes. Large intervention trials are still necessary to confirm that the pharmacist's involvement reduces healthcare resource use and costs.Is Collaboration the Way Forward for Pharmaceutical Practice?

Pharmaceutical interventions were either administered autonomously or within the framework of a collaborative practice with other healthcare providers in studies assessing the efficacy of pharmacy services. Several recent research have focused on the premise that a multidisciplinary approach is better for improving patient outcomes than unilateral therapies.[12 ]Research has recently shifted its focus from hospital pharmacy to primary care settings and

home care, with an emphasis on interdisciplinary collaboration.

A recent review emphasised the significance of a collaborative practice:12 Research on the early detection and monitoring of certain chronic diseases, such as diabetes and arterial hypertension, has increased significantly since the turn of the millennium, with a focus on multidisciplinary approaches. The pharmacist's intervention has been more effective in recent years due to an increase in interaction with patients and their caregivers, particularly the referring physician. When it comes to managing chronic conditions, making sure medication is used appropriately, and promoting overall wellbeing, the evidence points to the collaborative and patient-centered style of treatment as advantageous.[3] In a meta-analysis of 30 trials involving 3238 patients, multidisciplinary interventions in heart failure that included medical professionals along with a pharmacist, specialist nurse, health educator, dietician, or social worker decreased the risk of all cause admission by 13% (OR and 95% CI 0.87 (0.79 to 0.95); P=0.002), mortality by 21% (0.79 (0.69 to 0.92); P=0.002), and heart failure admission by 30% (0.70 (0.61 to 0.81); P<0.001).[32] A meta-analysis of 37 trials found that, when compared to standard treatment, team-based care interventions that included pharmacists led to better control of blood pressure.33 Researchers found a bigger benefit in studies using community pharmacies (OR and 95% CI 2.89 (1.83 to 4.55)) compared to studies including primary care clinic pharmacists (2.17 (1.75 to 2.68)). Studies involving pharmacists as opposed to nurses did not find any statistically significant differences in the effect. A more recent meta-analysis of 52 research corroborated these findings.[34] During a median follow-up of 12 months, hypertension patients and primary care providers were able to achieve better blood pressure results when a team-based treatment approach was implemented. This method mostly involved pharmacists, nurses, or both. Patients who received care from a multidisciplinary team were 12% more likely to achieve target blood pressure and showed greater improvements in systolic and diastolic blood pressure at follow-up (5.4 and 1.8 mm Hg, respectively), compared to those who received conventional care. Adding pharmacists to the team instead of nurses led to a greater improvement in blood pressure control, according to this meta-analysis. Additionally, there was no difference in the effect between interventions given in healthcare or community settings, which is an interesting finding. Proia and colleagues also examined the effects of lipids and diabetes, two additional cardiovascular risk

factors that frequently occur in conjunction with hypertension. Total cholesterol (−6.3 mg/dL, +13.0% of patients at goal), LDL cholesterol (−4.3 mg/dL, +3.2%), HDL cholesterol (+1.3 mg/dL, +6% at goal), hemoglobin A1c (−0.3%, +10%), and blood glucose (−7.0 mg/dL) were all improved by team-based care. Because of the growing complexity of cardiovascular disease treatment and medication regimens, pharmacists are now an integral element of these patients' care teams. Complementing the work of referring doctors and nurse practitioners, pharmacists are increasingly playing a key role in the care of patients who are experiencing heart failure, coronary heart disease, or are at high risk of cardiovascular disease, such as those with hypertension or diabetes. They can connect with patients on a personal level and become an invaluable resource for them. A pharmacist's long-standing relationships with other medical professionals allow them to act as a go-between for patients and their other healthcare providers, guaranteeing that patients will receive consistent attention. Furthermore, pharmacists have the authority to advise both patients and healthcare providers on how to maximize therapeutic results.

When it comes to addressing cardiovascular disorders, such as coronary heart disease and heart failure, pharmacists and other healthcare professionals, like nurses, may one day play an important role in a patient-centered medical home model. Comprehensive medication management is provided under this paradigm by a team of healthcare providers, including pharmacists, who work together with patients through a direct provider-patient connection.35 A multidisciplinary team of healthcare providers, including the pharmacist, will need to work together to develop a patient-specific strategy for treatment that meets therapeutic goals and includes enough follow-up to ascertain real patient result. The pharmacist's capacity, availability, and willingness to alter their professional demeanour are crucial to the success of the CPA. Under the direction of a physician, the pharmacist is responsible for continuously improving his or her knowledge and abilities in illness management through formal education and certification programs. This is why the American College of Cardiology has put out a manual for clinical pharmacists in the United States, outlining a curriculum and certification procedure that they can follow to provide excellent treatment to patients in a cardiology setting.[36]

The goal of this model's one-year postgraduate pharmacy residency program is to train future pharmacists to provide efficient, person-centered care to patients in a variety of settings, including community pharmacies, after they graduate. If you're interested in cardiology and want to focus on treating patients with heart conditions, you can add a year to your residency program to learn more about it. Certified anticoagulation care provider, certified diabetes educator, and clinical lipid specialist are just a few examples of the multidisciplinary certifications that pharmacists can get to help them better prevent and manage cardiovascular disease. Resident education may also cover topics such as managing a practice, leading a team, interpreting published data from the field of cardiovascular medicine, advocating for the prevention of cardiovascular disease, leading quality improvement initiatives, and teaching and educational activities.

Similar recommendations to govern pharmacists' practice in collaboration with physicians have been published by several medical societies. Training and certification procedures for clinical pharmacists working in interdisciplinary heart failure teams have been defined by the American College of Clinical Pharmacy Cardiology Practice and Research Network and the Heart Failure Society of America.37 Hypertension management recommendations for pharmacists have been released by the Canadian Hypertension Education Programme.[38]In a recent publication, the American Association of Colleges of Pharmacy offered suggestions for new models of healthcare delivery that might include community-based primary care pharmacists working in tandem with other medical professionals to better meet the needs of their patients.[35]

## FUTURE CHALLENGES

Although in the pharmacy setting patient education and medication management are the most popular interventions right now, and there's a rising demand for more treatments. These services should prioritize straightforward interventions over complex ones, as the latter carry the risk of introducing unknown confounders into the mix, rendering the outcome uncertain and at best partially beneficial to the patient. To be effective, these interventions must center on the patient's expectations of the pharmacist's service.

In order to better understand the effects of collaborative practice, future studies should seek to quantify and qualitatively assess the effects of pharmacists' interventions on the most common chronic conditions. Given the existing evidence, intervention studies involving pharmacists should target high-risk or complex patients and be sufficiently

large in terms of sample size and duration of follow-up. These studies should also be controlled and randomized to ensure fairness and evaluate various outcomes within the studied population. Due to the widespread availability of community pharmacy and the ongoing nature of the professional connection between patients, other healthcare administrators, and community pharmacists, it is imperative that these individuals participate in these research.

Last but not least, telemedicine and other health information technologies are making inroads into primary care and pharmacies, which might open up new channels of communication between patients and their healthcare providers regarding prescriptions, personal habits, and health status. By fostering a closer and more optimized relationship between pharmacists and doctors in a collaborative agreement practice, telemedicine will make it easier to screen individuals at risk for cardiovascular diseases and to give treated patients rapid and accurate feedback and treatment plan adjustments.[39]

## CONCLUSION:

In cases of hypertension, dyslipidaemia, diabetes, smoking cessation, and heart failure, there is some evidence that the intervention of pharmacists can affect the outcomes of patients with cardiovascular disease. Systematic reviews of these studies consistently find that public health could benefit from pharmacists being more actively involved in patient-centered activities and working in tandem with other healthcare professionals to achieve better results. More carefully planned and executed trials are needed in this area of study, nevertheless, before the therapeutic value of pharmacist interventions can be completely established. We believe that these types of studies should pay special attention to showing that people may be sensitive to the intervention of community pharmacists. The community setting should anticipate these treatments to have the greatest possible impact due to the widespread availability and ease of access to pharmacy services.

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