

## The Pharmacists' Role in Reducing Drug-Related Problems in Cardiology Center in Baghdad -Iraq: A Pilot Study

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### Abstract

Pharmacotherapy is essential to lower the morbidity and mortality associated with cardiovascular diseases (CVDs). Patients with CVDs are often given polypharmacy which increases both errors in prescriptions and the associated complications of medications. The objective of this study was to disclose the impact of clinical pharmacist contributions on reducing drug-related problems (DRPs) in patients with CVDs, educate the patients about the importance of adherence to their medication, and evaluate whether the clinical pharmacists can use the Pharmaceutical Care Network Europe (PCNE) version 9.1 as a useful tool to deal with DRPs when doing their work in a cardiovascular setting. A prospective, interventional study was conducted in Iraq -Baghdad at Ibn- AL-Bitar Center for cardiac surgery, involving 52 patients. The researcher screened patients' medical files, and any detected DRPs were recorded using PCNE V 9.1. classification. The researcher interviewed patients and cardiologists and intervened with the treatment to increase awareness about DRP. The degree of approval from a physician for interventions was also recorded. The researcher checked adherence based on the pill count method. Therapy and dosage schedules are evaluated based on the most recent therapeutic strategies guidelines (European Society of Cardiology 2021). Any potential adverse drug reactions or drug-drug interactions were evaluated. Interventions were commenced by the researcher, including medication initiation, medication adjustment, clarification of drug dosage and frequency, identification of contra-indications and incorrect indications, and patient counseling. The most frequent problems found were the adverse effects of drugs (57.2%), the potential problem (82.0%), and the manifested problem (18.0%). In addition, (28.2%) of DRPs were related to the unavailability of drugs. The most prevailing pharmacist intervention was intervention discussed with the prescriber (21.3%), patient counseling, speaking to family member (16.2%), then at drug level dosage changed (7.7%), drug changed, and drug stopped, and drug started (6.0%). Accordingly, patients with CVD have a high prevalence of DRPs. Pharmacists can play an important role in recognizing and reducing DRPs and the interventions they provided were well-accepted.

**Keywords:** Drug-related problems, Cardiovascular disease, PCNE, Clinical pharmacist interventions, Pharmacist role.

### Introduction

Cardiovascular diseases (CVDs) are a major source of morbidity and mortality that are becoming more and more prevalent <sup>(1)</sup>. According to reports from 2016, 17.9 million fatalities globally were attributed to CVD or 31% of all deaths <sup>(2)</sup>. In 2018, the World Health Organization (WHO) reported that in Iraq, there were 11,205 deaths (6.53%) due to stroke and 32,463 deaths (18.92%) due to coronary heart disease. The Ministry of Health in Iraq reported in 2019 that 27% of total deaths in Iraq are related to CVDs <sup>(3)</sup>. Drug-related events or conditions that interfere with or have the potential to interfere with desired health outcomes are referred to as drug-related problems (DRPs) <sup>(4)</sup>.

Patients with CVD are typically taken many medications and exposed to multiple concomitant illnesses, such as diabetes. Therefore, there is a higher likelihood of DRPs arising in these patients<sup>(5)</sup>.

According to a 2022 study conducted in Iraq by Omer et al., depression is an independent predictor of (40%) and (33%) of post-myocardial infarction problems for female patients and male patients, respectively. These results in patients being prescribed more drugs (polypharmacy), which raises DRPs <sup>(6)</sup>. Drug-related problems can occur during the entire pharmaceutical process, from prescription to post-treatment monitoring. Most problems arise during the administration, distribution, and patient usage of a medicinal product; nevertheless, inadequate physician follow-up and reevaluation of the patient's therapy is also a significant issue <sup>(7)</sup>. Drug interactions, inappropriate usage, prescribing of inappropriate medications, mismatches between regimens and actual ones, poor adherence, insufficient patients' monitoring, insufficient surveillance for side effects, and many other problems are among the most prevalent problems

related to drug use. Drug-related problems result in significant morbidity and death as well as higher healthcare costs, all of which have an impact on the patient's quality of life<sup>(8)</sup>. Hospital wards and acute care settings are where clinical pharmacists do the majority of their duties. Drug blood level monitoring and dose calculations are additional services provided by clinical pharmacists<sup>(9)</sup>. Actively monitoring patients' responses by pharmacists reduces the number of medications prescribed, DRPs, and prescription costs while also improving patient adherence and satisfaction<sup>(10)</sup>. There are many studies about DRP such as a study done at the cardiac rehabilitation unit, cardiology department, Ain Shams University hospitals, in 2017 which demonstrated that clinical pharmacists could play an important role as part of a cardiac rehabilitation team through patient education and interventions to minimize DRPs<sup>(11)</sup>. Another study was performed in the cardiology ward of the University of Jordan Hospital in 2015 was concluded that a clinical pharmacist intervention has a significant impact on the cost of drug therapy and patient outcomes. The results support the usefulness of pharmaceutical care services for all hospitalized CVD patients<sup>(12)</sup>. Another study conducted at a public cardiac center in Iraq in 2018 by Amina M. Jabria, et al demonstrated that the important discharge drugs prescribed by cardiologists for patients with acute coronary syndrome (ACS) were significantly improved by pharmacists' intervention, potentially leading to better patient outcomes and reducing the number of potential prescribing problems<sup>(2)</sup>. Pharmaceutical Care Network Europe (PCNE) was developed as a classification scheme for drug-related problems in 1999, the newest version (9.1) was updated in February 2020 and included: "three primary domains for problems, nine primary domains for causes and five primary domains for Interventions. However, for further detail, there are seven grouped sub-domains for problems, 43 grouped sub-domains for causes, 17 grouped sub-domains for interventions, and 10 subdomains for intervention acceptance according to the Association of PCNE<sup>(13)</sup>. The PCNE classification system, which is updated and modified on a regular basis, has been used extensively in clinical practice and has internal consistency. A prior research demonstrated that clinical pharmacists may use the PCNE classification system to assist them in recording DRPs in a systematic manner<sup>(14)</sup>. The PCNE was applied in studies done in Iraq such as a study done by Talib et al in 2020 on hemodialysis patients, which found that Iraqi patients receiving hemodialysis had a notable proportion of DRPs<sup>(15)</sup>, and another study conducted by Alobeidi et al on decompensated liver cirrhosis patients found that outstanding collaboration between physicians and clinical pharmacists, resulting in a high acceptance

and full implementation rate for suggested therapies<sup>(4)</sup>.

The aim of this study was to disclose the impact of clinical pharmacist interventions on DRPs in patients with CVDs, educate all the patients in the study about the importance of adherence to their specific medication regimen, and assess whether PCNE version 9.1 can offer Iraqi clinical pharmacists a useful tool for the DRP process during regular work in the cardiovascular setting.

## Patients and Methods

### Study design

This was a prospective, interventional, study conducted in Iraq -Baghdad at Ibn- AL-Bitar Center for cardiac surgery, involving 52 patients, from December 2023 to the last January 2024.

### Inclusion criteria

- 1-Patient >18 years.
- 2-Patient with cardiovascular diseases such as myocardial infarction, stroke, heart failure, and coronary artery disease.

### Exclusion criteria

- 1-Patients receiving treatment on an outpatient basis.
- 2-Patients in Critical Care Unit (CCU) ward.
- 3- Patients in the surgical ward, or in intensive care patients.
- 4- Patients not willing to participate and patients with insufficient medical records.

### Data collection

The researcher screened the medical files of patients in the cardiology ward and recorded any DRP using the PCNE V.9.1<sup>(13)</sup>. The researcher pharmacist also interviews patients and hospital cardiologists and intervenes with the treatment to increase awareness among both patients and hospital cardiologists about DRP. The acceptance level of a physician for each intervention was also recorded and classified according to PCNE classification. The data was collected from patient's case sheets, including their demographic data, lab investigations, and medication history. The researcher also participated in daily morning tours with the physicians and clinical pharmacists. A thorough medication review was conducted by inspecting both the patient's medical chart in the hospital and other medications that the patient had brought from home. All information is double-checked with the patients themselves, caregivers, or physicians to ensure nothing is missed that is not mentioned in the case sheets. The researcher checked adherence based on the pill count method. Patient treatment and dosing regimens are assessed based on the most recent therapeutic strategies recommended in the evidence-based guidelines (European Society of Cardiology 2021)<sup>(16)</sup>. Any potential ADRs or drug-drug interactions are evaluated. Interventions initiated by the researcher include patient counseling, medication initiation, medication adjustment, clarification of drug dosage and

frequency, identification of contraindications and incorrect indications, discovery of harmful drug

interactions, patient education, and patient counseling for lifestyle modifications.

## Results

The study sample consisted of 52 patients with a mean age of 59.8 years. Of these, 33 patients were male (63.5%), 19 (36.5%) patients were female, 48 patients (92.3%) were married, 3 patients

(5.8%) were single, 59.6% of patients were unemployed, and 28.8% of patients were retired. as shown in (Table 1).

**Table 1. Demographic data of patients**

Parameters	Categories	Number	Percent %
Gender	Male	33	63.5
	Female	19	36.5
Age in years mean $\pm$ SD	59.8 $\pm$ 14.603		
Social state	Married	48	92.3
	Single	3	5.8
	Divorced	1	1.9
Education level	No formal education	14	26.9
	Primary education	14	26.9
	Secondary education	14	26.9
	Bachelor's degree	9	17.3
	Others	1	1.9
Place of residence	Baghdad	43	82.6
	Al-Anbar	2	3.8
	Babil	2	3.8
	Diyala	1	1.9
	Kirkuk	1	1.9
	Dhi Qar	1	1.9
	Salah Alden	1	1.9
	Wasit	1	1.9
Employment status	Unemployed	31	59.6
	Retired	15	28.8
	Employed	6	11.5

Ischemic heart disease, heart failure, and arterial fibrillation were the most common

conditions diagnosed (67.3%, 21.2%, 13.5%) respectively as shown in (Table 2).

**Table 2. Diagnosis of patients**

Parameters	Subcategory	Number of patients	Percent %
Diagnosis	IHD	35	67.3
	HF	11	21.2
	AF	7	13.5
	CKD	7	13.5
	Thromboembolism	6	11.5
	Anasarca	1	1.9
	Aortic aneurism	1	1.9
	DVR	1	1.9
	Rheumatic fever	1	1.9
	Asthma	1	1.9
	COPD	1	1.9
	Shock	1	1.9
	Dental extraction	1	1.9
	Diabetes mellitus	1	1.9

AF: atrial fibrillation, CKD: chronic kidney disease, COPD: Chronic obstructive pulmonary disease, DVR: Double Valve Replacement, HF: heart failure, IHD: ischemic heart disease.

Most of the patients who participated in the study had more than one problem (73.1%), and

(26.9%) had only one problem, as shown in (Table 3).

**Table 3. Number of problems per patient**

Number of problems	Number of patients	Percent %
One problem	14	26.9
More than one problem	38	73.1
Total	52	100.0

The total number of DRPs detected by the researcher was 117. The problems occur mostly related to heparin, bisoprolol, pantoprazole,

ceftriaxone, aspirin, and enoxaparin (7.7 %,5.1%, 4.3%, 9.6%) respectively as shown in (Table 4).

**Table 4. Drugs-related problems detected by the pharmacist**

Item name	Subcategory	Number	Percent %
Drugs related problems	Heparin	9	7.7
	Bisoprolol	6	5.1
	Pantoprazole	6	5.1
	Ceftriaxone	5	4.3
	Enoxaparin	5	4.3
	Aspirin	5	4.3
	Lisinopril	4	3.4
	Omeprazole	4	3.4
	Clopidogrel	4	3.4
	Furosemide amp	4	3.4
	Warfarin	4	3.4
	Amiodarone	4	3.4
	Empagliflozin	3	2.6
	Glimepiride	3	2.6
	Spirolactone	3	2.6
	Calcium gluconate amp	3	2.6
	Isosorbide dinitrate	3	2.6
	Rosuvastatin	3	2.6
	Ibuprofen	2	1.7
	Digoxin	2	1.7
Candesartan	2	1.7	
Metoprolol tab	2	1.7	
Sacubitril\ Valsartan	2	1.7	
Others	29	24.7	
Total	117	100.0	

The most prevalent problems detected were related to treatment safety (57.3%), followed by, other problems such as unclassified problems (37.6%),

and treatment effectiveness (5.1%), as shown in (Table 5).

**Table 5. Distribution of the study sample according to problems.**

Main drug-related problems	Number (%)
Treatment safety	67 (57.3%)
Treatment effectiveness	6 (5.1%)
Other	44 (37.6%)

Most DRPs were related to the adverse effect of drugs (57.2%), unclear problems\ complaint (36.7%), followed by untreated symptoms (3.4%), as shown in (Table 6).

**Table 6. Distribution of study sample problem according to sub-domains.**

Sub-domain problems	Frequency (%)
Adverse drug event	67 (57.2%)
Unclear problem\complaint	43 (36.7%)
Untreated symptoms	4 (3.4%)
Effect of drug treatment not optimal	1 (0.9%)
No effect of drug treatment despite correct use	1 (0.9%)
Unnecessary treatment	1 (0.9%)
Total	117 (100%)

where the prevalence of the potential problems was much higher (82.0%) than the manifested problems (18.0%), as seen in (Table 7).

There was another classification of DRPs in PCNE according to the occurrence of the detected problems as Potential problems and manifested problems

**Table 7. Distribution of problems according to the occurrence**

Problems incidence	Frequency (%)
Potential problem	96 (82.0%)
Manifested problem	21 (18.0%)

There were 16 causes of DRPs according to the PCNE classification. 33 (28.2%) of DRPs related to dispensing, 24 (20.5%) related to other (no monitoring), 21 (17.9%) related to drug selection, 20

(17.1%) related to the patient, 13 (11.1%) related to dose selection and 6 (5.2%) related to drug use process as shown in (Table 8).

**Table 8. Distribution of DRP according to causes**

The main domain of causes	Frequency (%)	Sub-domain of causes	Frequency (%)		
Dispensing	33 (28.2%)	C5.1. Prescribed drug not available	33 (28.2%)		
Other	24 (20.5%)	C9.1. No monitoring	24 (20.5%)		
		C1.3. Inappropriate combination of drugs	17 (14.5%)		
		C1.1. Inappropriate drug according to guidelines	2 (1.7%)		
Drug selection	21 (17.9%)	C1.5. No or incomplete treatment	2 (1.7%)		
		C7.1. Patient intentionally not take drug	8 (6.8%)		
		C7.8. Patient use drug wrongly	6 (5.1%)		
		C7.7. Inappropriate timing	3 (2.6%)		
Patient-related	20 (17.1%)	C7.3. Patient abuse drug	2 (1.7%)		
		C7.4. Patient decides use unnecessary drug	1 (0.9%)		
		Dose selection	13 (11.1%)	C3.1. Drug dose too low	7 (6.0%)
		C3.2. Drug dose too high	3 (2.5%)		
Drug use process	6 (5.2%)	C3.4. Dosage regimen too frequent	3 (2.5%)		
		C6.4. Drug not administered	5 (4.3%)		
		C6.2. Drug under-administered	1 (0.9%)		

The most common pharmacist intervention was intervention discussed with the prescriber (21.3%) followed by patient drug counseling, spoken to family member\caregiver (16.2%), intervention

proposed to the prescriber (15.4%), dosage changed (7.7%), drug changed (6.0%), and drug stopped, drug started also was (6.0%) as shown in the (Table 9).

**Table 9. Planned interventions by a clinical pharmacist to physician**

Planned intervention	Subcategory	Number	Percent %
Planned intervention	I1.4 Intervention discussed	25	21.3
	I2.1 Patient counselling	19	16.2
	I2.4 Spoken to family	19	16.2
	I1.3 Intervention proposed	18	15.4
	I3.2 Dosage changed	9	7.7
	I3.1 Drug changed	7	6.0
	I3.5 Drug stopped	7	6.0
	I3.6 Drug started	7	6.0
	I1.1 Prescriber informed	3	2.6
I3.4 Instruction changed	3	2.6	

Interventions accepted and fully implemented were observed in (74.4%) while interventions accepted, partially implemented were (12.0%), and

intervention accepted, not implemented were (8.5%) as seen in (Table 10).

**Table 10. Acceptance of physician to clinical pharmacy interventions**

Item name	Subcategory	Number	Percent %
Acceptance of the intervention	A1.1 Accepted, fully implemented.	87	74.4
	A1.2 Accepted, partially implemented	14	12.0
	A1.3 Accepted, not implemented	10	8.5
Intervention not accepted	A2.2 No agreement	4	3.4
	A2.1 Not feasible	2	1.7

Most of the problems were totally solved (74.4%), followed by the problems partially solved (12.0%),

problems not solved, lack cooperation of prescriber (8.5%) as shown in (Table 11).

**Table 11. Status of the problems after interventions**

Item name	Subcategory	Number	Percent %
Status of problems	Problem totally solved.	87	74.4
	Partially solved.	14	12.0
	Not solved, lack cooperation of prescriber	10	8.5
	No need to solve the problem.	4	3.4
	Not solved, lack cooperation of patient	2	1.7

## Discussion

A variety of DRPs can arise in individuals using cardiovascular medicines<sup>(17,18)</sup>. In Iraq, the integration of clinical pharmacists in the healthcare field especially in cardiology is limited till now. Thus, this prospective interventional study set out to investigate how clinical pharmacists find and identify DRPs and evaluate their ability to address these DRPs by implementing the necessary interventions at every step of the cardiology ward process. A collaborative effort between physicians and clinical pharmacists can aid in the early identification of DRPs and mitigate associated

challenges by prioritizing appropriate pharmacotherapeutic therapy<sup>(19)</sup>. In this study, patients suffering from CVDs were male much more than females which is same as a study done in India in 2014 by Shareef.et al were out of 44 patients, (72.72%) were males, and (27.28%) were females<sup>(20)</sup>, this may be related to habits and lifestyles such as heavy smoking, alcohol intake, and stressful work found in males more than females. Patients suffering from an adverse drug event were the most common DRPs found in the current study, this result was supported by the

study conducted in Cyprus in 2016 by Gökçekuş et al where (54%) of these problems were identified as adverse drug reactions<sup>(21)</sup>. This finding contrasted

with research by Celin et al where the most common DRP was found to be drug interaction which accounted for 25.0% of total DRPs followed by drug use without indication (15.0%) and adverse drug reaction (15.0%)<sup>(22)</sup>. This means that less serious problems occur in the current study which may be related to the continuous follow-up of patients by cardiologists, more adherence to guidelines, and the good role of pharmacists and their interventions in the therapeutic process. Additionally, the current study (found more problems from the highest prevalence to the lowest) occur with anticoagulants, beta-blockers, proton pump inhibitors, ceftriaxone, antiplatelet, and antihypertensive. This finding came in line with that of a study done in 2013 by Abraham in India which showed that antihypertensives, antiplatelet medications, anticoagulants, antihyperlipidemic, and antiulcer have high DRPs<sup>(23)</sup>.

The most common cause of problems found in this study was "prescribed drugs not available, no monitoring, and followed by the inappropriate combination of drugs, then patient intentionally use/takes less drug than prescribed or did not take the drug at all for whatever reason", these results contradicting that of a study done in 2014 in India, where the major DRPs were sub-therapeutic dose, overdose, and drug use without indications<sup>(24)</sup>. A possible explanation for prescribing drugs not available may be that many essential drugs are not supplied or provided in small quantities by the State Company for Marketing Drugs and Medical Appliances (KIMADIA), but it is purchased by sub-purchasing committees within the hospital depending on financial allocation. KIMADIA is a governmental entity in Iraq that works under the regulation of the Iraqi Ministry of Health and is responsible for the procurement, storage, and distribution of drugs, medical supplies, and equipment for use in public health facilities, such as public hospitals and primary care settings, throughout all 18 provinces of Iraq<sup>(25)</sup>.

In this study, the most problem caused by patients was the patient intentionally not take drug, a research conducted at the Internal Medicine ward and CCU in Iraq in 2023 by Mohammed et al observed that (13.1%) of patients were about to omit an existing drug<sup>(26)</sup>. Patients not taking drugs despite acknowledgment of the importance of drug adherence may be related to the patient's poor health condition and numerous medications which burden him, and changing the patient caregivers continuously which makes the therapeutic process difficult. In this study, the drug with the most frequent DRPs was heparin where the dose was too low, and the dosage regimen was too frequent. Another problem found was a combination of heparin (or enoxaparin) with ceftriaxone which led to increasing prothrombin time, the (enoxaparin-ceftriaxone) drug interaction was also detected in a

study done in India by Biradar S.M. et al in 2022 which constituted (10.7%) of the total drug-drug interactions detected in this study<sup>(27)</sup>. Another interaction reported in the current study was between ceftriaxone and calcium gluconate will lead to the precipitation of calcium in the kidney and lung causing organ failure these results are supported by a study conducted in Iraq in 2015 by Al-Jumaili et al where this interaction was one of the most serious interactions found<sup>(28)</sup>.

The planned intervention conducted by the researcher in this study was mostly intervention discussed with the prescriber followed by intervention proposed to the prescriber, patient counseling for drug, and speaking to family member/caregiver. In another study conducted in Cyprus in 2016 by Gökçekuş et al, patient counseling was the most planned intervention<sup>(21)</sup>. A study conducted in Ghana in 2022 by Amankwa et al demonstrated that the majority of interventions were made at the physician level (49.4%)<sup>(29)</sup>. The reason behind the higher frequency of intervention discussed with prescribers was that the cardiologists asked for references and approval according to guidelines about the intervention of the researcher. Most of the problems detected in this study were totally solved, which comes in line with a study by Elhabib M et al in Palatine in 2022 were (92.1%) of the problems were totally resolved<sup>(30)</sup>.

## Limitations

The main limitations were the small sample size, short duration, not all hospital wards being included, and the fact that the study was conducted at a single center.

## Conclusion

Patients with cardiovascular diseases have a significant prevalence of drug-related problems. Adverse drug reactions were found in most DRPs where the potential problems occurred more than manifested problems. The main cause of the problems was the prescribed drug not available, inappropriate combination of drugs, and the patient intentionally not taking the prescribed drug. Anticoagulants, beta-blockers, and proton pump inhibitors were the most frequent drug classes involved in DRPs. Most of the interventions were accepted and most of the problems found were totally solved. This finding of the PCNE model for DRPs classification will be helpful in categorizing problems and may serve as a foundation for offering Iraqi clinical pharmacists a suitable tool for the DRP process during their regular work in the cardiovascular setting.

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### Conflicts of Interest

The authors declare that there is no conflict of interest.

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### Ethics Statements

This study was approved by the ethics committee of the College of the Pharmacy (University of Baghdad (acceptance number REAUBCP312024G))

### Author Contribution

The authors confirm contribution to the paper as follows: study conception and design: Farah A., Mohammed Y.J.; data collection: Farah A.; analysis and interpretation of results: Farah A., Mohammed Y.J.; draft manuscript preparation: Farah A., Mohammed Y.J. All authors reviewed the results and approved the final version of the manuscript.

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## دور الصيدالفة في الحد من المشاكل المتعلقة بالأدوية في مركز أمراض القلب في

بغداد – العراق

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### الخلاصة

العلاج الدوائي ضروري للحد من المرض والوفيات المرتبطة بأمراض القلب والأوعية الدموية. غالباً ما يتم إعطاء المرضى الذين يعانون من أمراض القلب والأوعية الدموية أدوية متعددة مما يزيد من الأخطاء في الوصفات الطبية والمضاعفات المرتبطة بالأدوية. كان الهدف من هذه الدراسة هو الكشف عن تأثير مساهمات الصيدلي السريري على الحد من المشاكل المتعلقة بالأدوية في المرضى الذين يعانون من أمراض القلب والأوعية الدموية، وتقييم المرضى حول أهمية الالتزام بأدويتهم، وتقييم ما إذا كان يمكن للصيدالفة السريريين استخدام شبكة الرعاية الصيدلانية في أوروبا (PCNE) الإصدار 9,1 كأداة مفيدة لعملية عند القيام بعملهم في مركز أمراض القلب. أجريت دراسة تداخلية مستقبلية في العراق - بغداد في مركز ابن البيطار لراحة القلب، شملت 52 مريضاً. قام الباحث بفحص الملفات الطبية للمرضى، وتم تسجيل المشاكل الدوائية المكتشفة باستخدام تصنيف PCNE V 9.1. يقوم الباحث بإجراء مقابلات مع المرضى وأطباء القلب ويتدخل في العلاج لزيادة الوعي حول المشاكل الدوائية. كما تم تسجيل درجة موافقة الطبيب على التدخلات. قام الباحث بفحص الالتزام بناء على طريقة عد الحبوب. يتم تقييم جداول العلاج والجرعات بناء على أحدث إرشادات الاستراتيجيات العلاجية (الجمعية الأوروبية لأمراض القلب 2021). تم تقييم أي تفاعلات دوائية ضارة محتملة أو تفاعلات دوائية دوائية. بدأ الباحث التدخلات، بما في ذلك بدء الدواء، وتعديل الدواء، وتوضيح جرعة الدواء وتكراره، وتحديد موانع الاستعمال والمؤشرات غير الصحيحة، وتقديم المشورة للمرضى. كانت المشاكل الأكثر شيوعاً التي تم العثور عليها هي الآثار الضارة للأدوية (57,2٪)، والمشكلة المحتملة (82,0٪)، والمشكلة الظاهرة (18,0٪). بالإضافة إلى ذلك، (28,2٪) من المشاكل الدوائية مرتبطة بعدم توفر الأدوية. كان التدخل الصيدلي الأكثر شيوعاً هو التدخل الذي تمت مناقشته مع الوصف (21,3٪)، وتقديم المشورة للمرضى، والتحدث إلى أحد أفراد الأسرة (16,2٪)، ثم تغيرت الجرعة على مستوى الدواء (7,7٪)، وتغير الدواء، وتوقف الدواء، وبدأ الدواء (6,0٪). وفقاً لذلك، فإن المرضى الذين يعانون من الأمراض القلبية الوعائية لديهم معدل انتشار مرتفع للمشاكل الدوائية. يمكن للصيدالفة أن يلعبوا دوراً مهماً في التعرف على المشاكل الدوائية والحد منها وكانت التدخلات التي قدموها مقبولة جيداً.

الكلمات المفتاحية: المشاكل المتعلقة بالأدوية، أمراض القلب والأوعية الدموية، PCNE، تدخلات الصيدلي السريري، دور الصيدلي.