DOI: https://doi.org/10.31351/vol35iss2pp136-144

Identifying Medication-Related Risk Factors among Iraqi Hospitalized Older Patients with Cardiovascular Disease: A Cross-Sectional Study

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Received 28/7/2025, Accepted 17/11/2025, Published 24/6/2026

Abstract

Cardiovascular drugs are the most commonly prescribed therapeutic classes among older adults, reflecting the high burden of cardiovascular diseases in those patients. Prescribing in elderly people is challenging due to age-related physiological changes, geriatric syndromes, and multi-morbidity. Identifying risk factors associated with medication use is imperative to improve medication management, reduce the risk of medication errors, and optimize therapeutic outcomes. The aim of the present study was to explore medication-related risk factors among a group of older patients. A cross-sectional study was conducted using convenience sampling method to enroll hospitalized older patients attending the Cardiac Care Unit of Baquba Teaching Hospital in Diyala province from December 2024 to February 2025. Risk factors were estimated through the validated Medication Risk Questionnaire (MRQ). A total of 200 patients were included in the study, of whom 111(55.5%) were female. The median age (interquartile range) was 71 (68-74) years. Using more than five medications (89.5%), having more than one physician involved in their healthcare (39.5%), using medications for three or more different health conditions (63.5%), using narrow therapeutic index medications (36.5%), and frequent changes to their medication regimen (35%) were among the types of detected risk factors. Upon stratification according to the medication risk score, 113 (56.5%) patients met the criteria for the high-risk group. Based on MRQ, various factors that may place older patients at risk for drug-related problems had been identified. These findings underscore the need for multi-faceted interventions like periodic structured medication review, medication reconciliation, and applying de-prescribing practices to avoid problematic polypharmacy, ensure the rational use of medications, and reduce unnecessary healthcare utilization.

Keywords: Cardiovascular disease, Medication-related problem, Older adults, Polypharmacy, Risk assessment.

Introduction

Cardiovascular disease (CVD) remains one of the most common reasons for hospital admission, especially in the elderly. It correlates with high mortality and morbidity rates, tremendous financial impact on healthcare systems, and poor quality of life [(1)]. Although medications have a pivotal role in the management of illnesses including CVDs, they might cause adverse outcomes unless properly utilized [(2)]. Drug-related problem (DRP) is any circumstance or event involving medication that interferes actually or potentially with desired health outcomes [(3)]. The elderly population is vulnerable to an elevated risk of drug-related problems (DRPs) owing to age-related pharmacokinetics, pharmacodynamics changes along with the presence of multi-morbidity necessitating multiple medications, which can result in an unpredictable response [(4)].

Monitoring drug-related risk factors in older adults can be achieved through including risk assessment tools in the inclusive health screening [(5)]. Medication-risk questionnaires (MRQs) are of interest as a way to recognize patients who are at a greater risk for encountering a DRP and could thus gain benefit from a medication review [(6)]. Management of drug-related risk has become fundamental focus in the area of patient safety research. Estimates that nearly half of the drug-related issues causing serious harm could be minimized or prevented when targeted interventions implemented at various stages of the medication use cycle [(7)]. Otherwise, inadequate risk management may cause preventable adverse drug events (ADEs), compromise patient well-being, enhance the likelihood of unplanned hospitalization, and impose a significant economic burden to healthcare systems and society [(8, 9)]. A previous longitudinal study investigating hospitalization caused by adverse drug reactions (ADRs) over a 13-years period found that CVD

drugs were the leading therapeutic class contributing to medication harm, including long-term disabilities and fatalities [10]. In Iraq, several previous studies have assessed medication utilization in elderly. For instance, in Kirkuk a study conducted by Kemal et al. in 2017 included older patients attended the outpatient clinic of the Geriatric Medicine Department revealed a high prevalence of polypharmacy [11]. Another study carried out by Abbas et al. in 2021 found that a large proportion of elderly used more than one medication, with cardiovascular agents being the main drug class used, and they are uninformed about the side effects of their prescribed medications [12]. Similarly, a study conducted by Mustafa et al. found that polypharmacy was highly prevalent among a significant portion of the older Iraqi patients [13].

However, the term polypharmacy reflects only the number of medications being taken and cannot gauge the quality of medication management and use since if medication regimens are well-planned, polypharmacy will not impose a problem [14]. Accordingly, to understand the context of medication-related concerns in holistic manner, other risk factors associated with medication use should also be considered, since they have been little explored, and warrants further investigation.

Nevertheless, to the best of the authors' knowledge, no previous study has assessed medication-related risk factors among hospitalized older patients in Iraq; therefore, this study aims to investigate risk factors for DRPs among a group of older inpatients with CVDs to develop a comprehensive picture of medication utilization among these vulnerable patients.

Patients and Methods

Study design and setting

A cross-sectional hospital-based study was conducted using convenience sampling method to enroll elderly patients with CVDs who were hospitalized at Baquba Teaching Hospital in Diyala province from December 2024 to February 2025. Baquba Teaching Hospital is the main tertiary care hospital in Diyala province. It includes a Cardiac Care Unit (CCU) dedicated to the management of patients with acute and chronic CVDs, and serves as a referral center for both rural and urban populations.

Inclusion criteria

Patients aged 65 years and older from both genders admitted to the CCU, previously diagnosed with CVDs, consuming chronic medications, with good cognitive function, and deemed clinically stable to be able to communicate with the researcher. Also, the Patients' caregivers, who are familiar with their daily and medical needs were included in the study.

Exclusion criteria

Patients with terminal illnesses receiving palliative care and those who received acute care in the emergency department.***Sample size calculation***
The sample size was determined using G*Power version 3.1.9.7 software. Using a medium effect size (Cohen's w = 0.30), a statistical power of 0.80, and a significance level (α) of 0.05. The minimum required sample size was determined to be 150 participants [15]. To ensure adequate events per variable (EPV) for logistic regression analysis and to increase the representativeness and statistical precision of the findings, a total of 200 patients were eventually enrolled in this study.

Data collection

Socio-demographic patient's data, such as age, sex, educational level, monthly income, social state, and residence were obtained during face-to-face interview with each patient and/or their closest proxy. Clinical variables were obtained during the interview and verified from the patient's medical record, including the type of cardiovascular disease/s, type of comorbid condition/s, and hospital admission during the past year.

Frailty status was assessed by the Clinical Frailty Scale, a non-invasive nine-item validated tool ranged from 1(fit) to 9 (terminally ill). To assist the classification process, each point on this scale has pictographs (an image that represents a word or data) with a written description of frailty. Accordingly; those with a score of five or more were considered frail [16]. Each interview with the patient or his close relative lasted approximately between 15-20 minutes.

Estimation of medication risk

The risk associated with medication use was evaluated by the 8-item version of medication risk questionnaire (MRQ) [17]. This validated tool can identify patients at an increased risk of DRPs, especially among the elderly. The tool comprised questions positively correlated with drug risk. The sum of item scores ('yes') was used to calculate the risk level of DRPs. In addition, according to the original validation study on MRQ, a cutoff score of 4 or more discriminated higher-and lower-risk groups. Therefore; participants were dichotomized into two groups: low-risk (score zero to three) or high-risk (score four or more) of DRPs. It was translated into Arabic language and underwent linguistic validation by five academics holding PhD in clinical pharmacy for face and content validity. Pilot study was conducted on 25 patients, yielding a Cronbach's alpha of 0.74, which demonstrates an acceptable level of internal consistency. However, owing to limited patient access after hospital discharge, full psychometric validation (including test-retest reliability) could not be performed. To minimize recall bias, the first author verified the chronic medications used by the patients by

reviewing the medications and prescriptions brought by patients.

Statistical analysis

Data analysis was done using SPSS (Statistical Package for Social Science) version 27. The normality of continuous data was checked through the Shapiro–Wilk test. Accordingly, continuous variables were presented as the median interquartile range (IQR) due to their skewed nature. Categorical variables were presented as counts and percentages. The chi-square test was used to evaluate the association between socio-demographic and clinical characteristics of patients according to their risk groups. To identify factors predicting a high risk of DRPs, univariate and multivariate binary logistic regression analysis (backward method) was constructed. The results were expressed as odds ratios (ORs) with corresponding 95% confidence intervals (95% CI). To declare the association, statistical significance was set at $p < 0.05$ (two-tailed).

Results

A total of 200 inpatients were recruited in the study, of whom 111(55.5%) were female. The median age (IQR) was 71 years (68-74). More than half of the patients (58%) were married and the majority had low to medium income. The demographic data are depicted in Table 1.

Table 1. Socio-demographic characteristics of the participants

Variables	Categories	Number	Percent (%)
Age groups (years)	65-74	154	77
	≥75	46	23
Sex	Male	89	44.5
	Female	111	55.5
Educational level	Illiterate	26	13
	Primary	46	23
	Secondary	67	33.5
	College and higher	61	30.5
Social state	Single	19	9.5
	Married	116	58
	Widowed	65	32.5
Residence	Rural	69	34.5
	Urban	131	65.5
Monthly income	Less than 500,000 IQD	63	31.5
	500,000-1 million IQD	113	56.5
	More than 1 million IQD	24	12

IQD: Iraqi dinar

Regarding clinical status, more than half of patients were frail (58.5%), and 81 (40.5%) had been hospitalized in the past year. The study population showed a high prevalence of multi-morbidity, with (63.5%) having three or more chronic conditions. Ischemic heart disease, arterial hypertension, heart failure, and atrial fibrillation were the most prevalent CVDs, while diabetes mellitus was the most dominant comorbid condition, as shown in (Table 2).

Table 2. Clinical characteristics of the study participants

Variables	Categories	Number	Percent
Frailty status	Non frail	83	41.5
	Frail	117	58.5
Number of chronic diseases	1-2	73	36.5
	≥ 3	127	63.5
Hospitalization in the previous year	No	119	59.5
	Yes	81	40.5
Type of cardiovascular disease	Ischemic heart disease	119	59.5
	Heart failure	78	39
	Arterial hypertension	103	51.5
	Atrial fibrillation	47	23.5
	Supraventricular tachycardia	13	6.5
	Cerebrovascular accident	21	10.5
	Valvular heart disease	7	3.5

Type of comorbidities	Diabetes mellitus	89	44.5
	Chronic kidney disease	14	7
	Chronic obstructive pulmonary disease	8	4
	Asthma	16	8
	Gout	2	1
	Hyperthyroidism	8	4
	Rheumatoid arthritis	1	0.5
	Benign prostatic hyperplasia	7	3.5
	Peptic ulcer	5	2.5
	Hypothyroidism	4	2
	Epilepsy	1	0.5

Upon stratification according to the medication risk score, 87 participants (43.5%) of the cohort was considered as being at low risk of DRPs, while 113 individuals (56.5%; 95%CI: 49.6-63.4) of the cohort were considered at high risk. The number of risk factors was ranged from 0 (1.5%) to 8 (4%), as shown in Table 3.

Table 3. Number of risk factors per individual patient

Number of risk factors	Number of patients	Percent
0	3	1.5
1	15	7.5
2	31	15.5
3	38	19
4	31	15.5
5	36	18
6	28	14
7	10	5
8	8	4
Median (IQR) 4(3-5)		

IQR: Interquartile range

Based on MRQ, several key risk factors for DRPs were identified. These included the regular use of more than five medications, the daily intake of twelve or more capsules or tablets (pill burden), the use of narrow therapeutic index drugs such as digoxin or warfarin, and the involvement of multiple prescribers, among other factors. The distribution of risk factors identified in the included patients are illustrated in Table 4.

Table 4. Frequencies of yes response to Medication Risk Questionnaire

Items	Number * (%)	(95% CI)
Take more than five medicines	179 (89.5)	(85.2-93.7)
Take twelve or more tablets or capsules per day	34(17)	(11.8-22.3)
Take narrow therapeutic index drugs	73(36.5)	(29.8-43.2)
Have more than one prescriber	79 (39.5)	(32.7-46.3)
Take medicines for three and more medical conditions	127(63.5)	(56.8-70.2)
Medicines filled from more than one pharmacy	130 (65)	(58.3-71.7)
More than one person brings medicines home	46 (23)	(17.1-28.9)
Four times or more changes to medicines in one year	70 (35)	(28.3-41.7)

*Totals do not add up to 100% because patients could have one or more risk factor. **CI**: Confidence interval

Comparing patients' characteristics according to their risk groups revealed a statistically significant difference regarding age groups, number of chronic diseases, frailty and being hospitalized in the past year (p-values: 0.018, 0.001, 0.002 and <0.001, respectively), as shown in Table 5.

Table 5. Socio-demographic and clinical characteristics of participants stratified by their medication risk groups.

Variables	Total (200) n (%)	Low-risk group (87) n (%)	High-risk group (113) n (%)	P-value *
Age groups (years)				
65-74	154 (77)	74 (85.1)	80 (70.8)	0.018*
>75	46 (٢3)	13 (14.9)	33 (29.2)	
Sex				
Male	89 (44.5)	45 (51.7)	44 (38.9)	0.085
Female	111(55.5)	42 (48.3)	69 (61.1)	
Educational level				
Illiterate	26 (13)	12 (13.8)	14 (12.4)	
Primary	46 (23)	20 (22.9)	26 (23)	0.79
Secondary	67 (33.5)	26 (30)	41 (36.3)	
College and higher	61 (30.5)	29 (33.3)	32 (28.3)	
Social state				
Single	19 (9.5)	9 (10.3)	10 (8.8)	0.807
Married	116 (58)	48 (55.2)	68 (60.2)	
Widowed	65 (32.5)	30 (34.5)	35 (31)	
Residence				
Rural	69 (34.5)	29 (33.3)	40 (35.4)	0.767
Urban	131 (65.5)	58 (66.7)	73 (64.6)	
Monthly income				
Less than 500,000 IQD	63 (31.5)	26 (30)	37 (32.7)	0.916
500,000-1 million IQD	113 (56.5)	50 (57.4)	63 (55.8)	
More than 1 million IQD	24 (12)	11 (12.6)	13 (11.5)	
Frailty status				
Non frail	83 (41.5)	47 (54)	36 (31.9)	0.002*
Frail	117 (58.5)	40 (46)	77 (68.1)	
Number of chronic diseases				
1-2	73 (36.5)	43 (49.4)	30 (26.5)	0.001*
≥3	127 (63.5)	44 (50.6)	83 (73.5)	
Hospitalization in the past year				
No	119 (59.5)	64 (73.6)	55 (48.7)	<0.001*
Yes	81 (40.5)	23 (26.4)	58 (51.3)	

* Asterisks denote significant association at p <0.05 according to Chi-square test. **IQD**: Iraqi dinar

By using binary logistic regression (backward method), frailty, number of diseases, and hospitalization in the past year were among the factors that predict high medication-related risk in the univariate and multivariate model, as illustrated in Table 6.

Table 6. Logistic regression analysis of factors associated with high medication-related risk

	Univariate analysis [a]		Multivariate analysis [b]	
Variable	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**
Age	1.062 (0.991-1.138)	0.086		
Sex	0.595 (0.338-1.048)	0.072		
Frailty	1.564 (1.248-1.959)	<0.001*	1.435 (1.135-1.813)	0.003*
Income level	0.904 (0.580-1.409)	0.656		
Number of diseases	1.926 (1.266-2.930)	0.002*	1.693 (1.085-2.639)	0.02*
Hospitalization in the previous year	0.341 (0.187-0.623)	<0.001*	0.375 (0.199-0.766)	0.002*
Residence	1.037 (0.567-1.899)	0.761		
Educational level	0.913 (0.506-1.645)	0.877		
Social state	0.947 (0.597-1.502)	0.816		

(*) Significant difference (P<0.05). **OR**: Odds Ratio, **CI**: Confidence interval.
(a) Binary logistic regression is used
(b) Binary logistic regression (backward method) is used

Discussion

The current study revealed a high prevalence of factors related to chronic medication use among elderly patients, which may be associated with a higher risk of experiencing DRPs. Nearly all of the included patients had at least one risk factor. As expected, polypharmacy (using more than five drugs) was detected in a large percentage given the cohort of study comprised older inpatients with multi-morbidity justifying the prescription of multiple medications. This finding was concurrent with the study carried out by Silva et al. reported that in patients with polypharmacy, cardiovascular drugs were the most prevalent class of medications [18].

The prevalence of polyharmacy reported in the current study was higher than in studies performed in Qatar, Oman, and Iraq (75.5%), (76.3%), and (49.9%) respectively [19-21]. The explanation for this variation could be attributed to differences in the studied population, study designs, study settings, the definition of polypharmacy and the prevalence of CVD risk factors.

In the current study, pill burden was identified in 17 % of patients, which may be correlated with suboptimal therapeutic outcomes, higher risk of ADEs, lower medication adherence, greater caregiver stress, and impose an economic burden [22-25]. Therefore, initiatives to simplify medication regimen should be attempted, whenever possible, by using once-daily medications and fixed-dose combinations.

The use of narrow therapeutic index drugs requires close monitoring of their effect with numerous drug-drug and drug-food interactions in case of warfarin, for example, which can be burdensome to patients and caregivers, increase the incidence of adverse effects, and reduce adherence. In a study conducted by AL-Ameen et al. in 2023 comparing adherence between warfarin and direct oral anticoagulants (DOACs) found that patients receiving DOACs had better adherence and self-efficacy compared to warfarin [26].

Additionally, a significant proportion of patients reported having more than one prescriber involved in their care, which may enhance the likelihood of poor coordination, as each physician may work independently and follow different treatment guidelines [27]. Furthermore, physicians sometimes consider only their area of expertise instead of patient as a whole. A previous study reported the existence of fragmentation of care in the management of multi-morbidity among elderly people [28]. Such a lack of coordination among.

specialists often results in patients being prescribed numerous medications culminating in the elevated potential of drug interactions. These findings underscore the potential advantage of implementing introductory steps that permit communication among all of a patient's care providers. Moreover, cost reduction and improved outcomes could be attained through integrated care, as demonstrated by a meta-analysis conducted by Rocks et al. in 2020 [29].

A large proportion of the cohort had three or more chronic diseases which presents a challenge and translates to concomitant medications, which may be correlated with a higher risk of clinically relevant drug-disease and drug-drug interactions (DDIs). This finding was congruent with a study conducted among elderly patients in Kuwait, which found that a large proportion were using five or more medications, had three or more non-communicable disorders (NCDs), and over half of them were prescribed potentially inappropriate medications, thereby elevating their risk of experiencing worsening clinical outcomes [٣٥]. In addition, a previous study conducted in Iraq by Mahmoud et al. reported that potentially inappropriate prescribing was highly prevalent among geriatric patients [31].

Filling medications from more than one pharmacy was reported by many participants. The consequence of multiple pharmacy users making it difficult for pharmacists to recognize therapeutic duplications and DDIs, so as possible, patients should be encouraged to use one pharmacy. In addition, a previous study found that enhancement of treatment adherence through fostering continuous communication with a pharmacist about drugs' benefits, uses, and side effects, in addition to a lower risk of confusion with medication management for older adults could be achieved by having a single pharmacy to get their prescriptions [32].

Caregivers have a crucial role in the health management of older patients, including providing social support, assisting with activities of daily living, and managing medications. While having many people bring and manage medication can be beneficial, it also carries the risk of poor communication between them in case of therapy omission, dosage or frequency manipulation. Therefore, having one person familiar with medication management could enhance patient's safety. Among the cohort (35%) underwent frequent changes to their medications in one year. Such changes may be associated with discrepancies and could be attributed to patients coping with multiple prescribers and frequent transitions of care. Therefore, medication reconciliation [33], maintaining an updated medication list, and avoiding unnecessary frequent changes between different brand and generic names can avoid catastrophic outcomes and improve the safety of these vulnerable populations. It is noteworthy to consider that older adults perform complicated routines to incorporate their medications into their daily lives; consequently, any change in their medication regimen may disrupt these routines and increase the burden.

Moreover, it is prudent to recognize potential prescribing cascades, whereby an ADE is misinterpreted as a new diagnosis and consequently, additional medications are prescribed to treat it [34].

Age, frailty, number of chronic conditions, and being hospitalized in the past year were significantly different across the risk groups, this could be attributed to the fact that all of the aforementioned variables coincide with more prescribed medications and more frequent medication changes [35, 36].

By taking into account the high medication risk among the studied population, the inclusion of pharmacists in healthcare team is mandatory, since pharmacists play an important role in optimizing medication across hospital wards, acute care settings, and community pharmacies, which results in reduction of DRPs, minimizes the number of medications being prescribed, and improves patient satisfaction and adherence [37, 38]. In a study conducted by Farah et al. in 2024 found that Pharmacists can have a prominent role in identifying and minimizing DRPs in cardiology wards with their interventions were endorsed [39]. Similarly, a study performed by Jabri et al. reported that pharmacist intersection had a remarkable positive impact on the prescribing behavior of cardiologists, which could enhance patient outcomes [40].

Limitations

First, the study included hospitalized patients recruited from a single hospital, which limits the generalizability of results. Second, its cross-sectional design allows for the identification of associations but not the determination of causal relationships. Third, the use of a convenience sampling method may have introduced potential selection bias. Moreover, the relatively small sample size resulted from the exclusion of many patients with critical conditions and unavailability of chronic medications besides some patients precluding risk estimation. Finally, test–retest reliability was not calculated to measure the reliability of the Arabic version of the MRQ tool.

Conclusion

The current study identified various risk factors for medication-related problems among the study participants, such as the number of medications, number of daily doses, the involvement of multiple prescribers, and others. These findings underscore the ongoing need for targeted interventions to improve medication use among older patients such as medication reconciliation and de-prescribing practices. Additionally, appropriate polypharmacy must be considered at each point of initiation of a new treatment and when the patient transferred across different healthcare settings to ensure safer utilization of medications.

Acknowledgment

The authors gratefully acknowledge Assist.Prof.Dr. Dheyaa Jabbar kadhim for his help in study's idea selection. The assistance and cooperation of the participants, physicians, pharmacist, and nurses in the Cardiac Care Unit at Baquba Teaching Hospittal are greatly appreciated.

Conflicts of Interest

There is no conflict of interest.

Funding

There was no external funding for this study.

Ethics Statements

The study was approved by the College of Pharmacy, University of Baghdad ethical committee (approval no. REC06202513R on November 24, 2024). Also, the Ministry of Health approved the study (approval no.50303 on December 12, 2024). Verbal informed consent was obtained from all participants. Confidentiality was maintained throughout the study and no incentives were offered to the study participants.

Author Contribution

The authors confirm contribution to the paper as follows: study conception and design: Noor Mubder Khalf, Mohammed Yawuz Jamal; data collection: Noor Mubder Khalf; analysis and interpretation of results: Noor Mubder Khalf, Mohammed Yawuz Jamal; draft manuscript preparation: Noor Mubder Khalf. All authors reviewed the results and approved the final version of the manuscript.

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التعرف على عوامل الخطر المرتبطة بالأدوية بين المرضى المسنين الراقدين في المستشفى المصابين بأمراض القلب والأوعية الدموية: دراسة مقطعية

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الخلاصة

تُعدّ أدوية القلب والأوعية الدموية الفئات العلاجية الأكثر شيوعًا لدى كبار السن، مما يعكس العبء المرتفع لأمراض القلب والأوعية الدموية في هذه الفئة من المرضى. يُعدّ وصف الادوية لكبار السن أمرًا معقدا بسبب التغيرات الفسيولوجية المرتبطة بالعمر، متلازمات الشيخوخة والأمراض المتعددة. يعتبر تحديد عوامل الخطر المرتبطة باستخدام الأدوية أمرًا ضروريًا لتحسين إدارة الأدوية، تقليل خطر الاخطاء الدوائية، وتحقيق أفضل النتائج العلاجية. كان الهدف من الدراسة هو التعرف على عوامل الخطر المرتبطة بالأدوية بين عينة من مرضى كبار السن. اجريت دراسة المقطعية باستخدام طريقة العينة المريحة لتسجيل المرضى كبار السن الراقدين في وحدة العناية القلبية بمستشفى بعقوبة التعليمي في محافظة ديالى للفترة من كانون الاول ٢٠٢٤ إلى فبراير ٢٠٢٥. قُدّرت عوامل الخطر من خلال استبيان مخاطر الأدوية المُعتمد. شملت الدراسة ٢٠٠ مريضا، من بينهم ١١١ امرأة، بمتوسط عمر ٧١ عامًا. استخدام أكثر من خمسة أدوية (89.5%)، وجود أكثر من طبيب يشرف على رعايتهم الصحية (39.5%)، استخدام أدوية لثلاث مشاكل صحية أو أكثر(63.5%)، وجود أدوية تتطلب مراقبة علاجية (36.5%)، والتغييرات المتكررة في نظامهم الدوائي (35%) كانت من بين أنواع عوامل الخطر المكتشفة. اعتمادا على مقياس خطر الادوية، تم تصنيف ١١٣مريضا (٥٦,٥%) ضمن فئة عالية الخطورة. استنادا الى استبيان مخاطر الادوية، تم تحديد مجموعة من العوامل التي قد تُعرّض المرضى المسنين لخطر المشاكل المتعلقة بالأدوية، مما يُظهر الحاجة الى تدخلات متعددة الجوانب مثل المراجعة المنهجية المستمرة للأدوية، تحديث قائمة الأدوية، تطبيق ممارسات إلغاء وصف الأدوية وتجنب تعدد الادوية الضار لضمان الاستخدام الرشيد للأدوية من قبل المرضى المسنين وتقليل الاستخدام غير الضروري للمؤسسات الصحية.

الكلمات المفتاحية: أمراض القلب والأوعية الدموية، مشاكل متعلقة بالأدوية، كبار السن، تعدد الادوية، تقييم الخطر.