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ORIGINAL ARTICLE



Medication adherence and hospitalizations in older patients with coronary heart disease in Vietnam

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Abstract

Aims: This study aimed to assess medication adherence among older people with coronary heart disease and its relationship with hospitalizations.

Methods: This is a prospective cohort study conducted at the outpatient clinics of a major hospital in Vietnam from November 2022 to June 2023. Consecutive older patients with coronary heart disease were recruited and followed for 6 months. Medication adherence was defined using the five-item Medication Adherence Report Scale (MARS-5). Multivariable logistic regression models were applied to examine the impact of medication adherence on hospitalization due to cardiovascular disease (CVD) and all-cause hospitalization.

Results: There were 643 participants, mean age 73 ± 8 years, 74.3% were male. Overall, 76.4% (491/643) were classified as 'adherent'. Over 6 months follow-up, 23.3% of the participants were admitted to hospital and of these hospitalizations, 9.2% were due to CVD. The CVD-related hospitalization rate was significantly higher in the non-adherent group compared to the adherent group (13.8% vs. 7.7%, P = 0.023, respectively). In logistic regression models, medication adherence was associated with significantly reduced odds of CVD-related hospitalization (adjusted odds ratio [OR] 0.48, 95% confidence interval [CI] 0.27–0.86). Medication adherence was also associated with a trend of reduced all-cause hospitalization (adjusted OR 0.75, 95% CI 0.49–1.15).

Conclusions: This study showed a positive relationship between medication adherence and reduced risk of CVD-related hospitalization in older people with coronary heart disease. Healthcare providers should consider incorporating adherence assessment into the long-term care for older patients with coronary heart disease.

KEYWORDS

coronary heart disease, frailty, MARS-5, medication adherence, multimorbidity, Vietnam

The authors confirm that the PI for this paper is Tan Van Nguyen (T.V.N.) and that he had direct clinical responsibility for patients.

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1 | INTRODUCTION

Coronary heart disease is the leading cause of mortality globally.¹ The prevalence of coronary heart disease increases with ageing.² The management of coronary heart disease aims to reduce cardiovascular events and mortality, control symptoms and improve quality of life.¹ The treatment of coronary heart disease is complex and generally includes a combination of optimizing risk factors, pharmacotherapy and percutaneous or surgical revascularization if indicated. Pharmacological management includes anti-anginal medications (such as nitrates, beta blockers, calcium channel blockers), and cardioprotective medications (such as antiplatelets, statins, angiotensin-converting-enzyme inhibitors or angiotensin receptor blockers).¹ These medications have been shown to reduce cardiovascular events in patients with coronary heart disease.¹ In older people with coronary heart disease, medication adherence is critical to manage this condition. However, poor medication adherence continues to be a significant health challenge worldwide and many studies have shown that medication adherence rates in older patients lie around 30% to 50%.^{3,4} Poor medication adherence can lead to worsening symptoms, increased risk of acute coronary syndromes and strokes, increased hospitalizations and reduced overall quality of life.^{3,5-7} Poor or suboptimal medication adherence may also lead to unnecessary therapeutic intensification, whether dose increase or addition of new agents. This can further increase the risk of potential harm from polypharmacy. The risk is further amplified for older persons due to the biological changes associated with ageing.

In Vietnam, the population is ageing, and coronary heart disease is among the leading causes of mortality in this population.⁸⁻¹¹ There have been several studies on medication adherence in patients with cardiovascular disease (CVD) in Vietnamese adults. In a study of 175 patients (mean age 61) hospitalized due to acute myocardial infarction, the adherence rate to antiplatelet therapy among the participants was guite high at 1 month after discharge (90.3%), then declining by 6 months (88.0%), 12 months (75.4%) and more than 12 months (46.3%).¹² A study conducted on 1038 patients with chronic CVD (mean age 63) published in 2022 showed that only 59.3% of the participants were adherent to their cardiovascular medications.¹³ Another study in 177 patients (median age 63) reported an adherence rate to oral anticoagulants of 37.7%.¹⁴ A study among people living in rural areas in Vietnam with hypertension (aged 35-64) showed that only 49.8% of the participants were adherent to antihypertensive medications.¹⁵ However, there is limited evidence on medication adherence in older people with coronary heart disease.

Therefore, the primary aims of this study were to assess adherence to cardiovascular medications in people aged 60 years or older with coronary heart disease, and to examine the relationship between medication adherence and CVD-related hospitalization in this population. The secondary aim was to examine the relationship between medication adherence and all-cause hospitalization.

What is already known about this subject

- Several studies on medication adherence among Vietnamese adults with cardiovascular disease found that adherence rates were suboptimal, ranging from 38% to 59%.
- However, there is limited evidence regarding medication adherence in older adults with coronary heart disease.

What this study adds

- This was the first study to examine medication adherence in older people with chronic coronary syndrome in Vietnam.
- Our study also reported the relationship of medication adherence with CVD-related hospitalizations, an outcome that is not routinely reported in studies on medication adherence.

2 | METHODS

2.1 | Study design and population

This prospective, observational study was conducted at the outpatient clinics of Thong Nhat Hospital in Ho Chi Minh City from November 2022 to June 2023. Consecutive patients aged ≥ 60 years diagnosed with coronary heart disease who visited the clinics during the study period were recruited. Coronary heart disease was defined if a patient had any of these criteria more than 3 months before participating in this study: (1) a history of acute coronary syndrome, or (2) significant stenosis on percutaneous coronary angiogram or computerized tomography coronary angiogram ($\geq 50\%$ for left main coronary artery, $\geq 70\%$ for other coronary arteries), or (3) percutaneous coronary interventions (PCI) or coronary artery bypass graft surgery (CABG). Exclusion criteria included (1) having dementia or having a mental illness that can affect their ability to answer the study questionnaires, (2) not being able to provide consent, and (3) having a life expectancy of <6 months.

The study was approved by the Ethics Committees of the University of Medicine and Pharmacy at Ho Chi Minh City (Reference Number 936/HDDD-DHYD, date 24/11/2022). Informed consent was obtained from all participants. This study was conducted in accordance with the Declaration of Helsinki.

2.2 | Data collection

Data were collected from patient interviews and medical records. Information obtained included demographic characteristics, height, weight, medical history, blood test results and comorbidities. Frailty was assessed using the Clinical Frail Scale (CFS).^{16,17} The CFS score ranges from 1 to 9, and a score of 4 or greater indicates a frailty status.^{16,18} Polypharmacy was defined as using five or more medications on a daily basis. Cardiovascular multimorbidity (CVD multimorbidity) was defined as having any of the following conditions in addition to coronary heart disease: heart failure, stroke, atrial fibrillation, peripheral artery disease, chronic kidney disease and diabetes.

2.2.1 | Assessment of medication adherence

Participants' medication adherence was assessed using the five-item Medication Adherence Report Scale, MARS-5 (© Professor Rob Horne).^{19,20} We used the Vietnamese version of the MARS-5 which was approved by Professor Rob Horne. The MARS-5 questionnaire comprised five components: (1) I forget to take my medicines, (2) I alter the dose, (3) I stop taking them for a while, (4) I decide to miss out a dose, (5) I take less than instructed. The first statement indicates unintentional non-adherence, and the other four statements indicate intentional non-adherence. The participants answered these five statements on a 5-point Likert scale (1, always; 2, often; 3, sometimes; 4, rarely; 5, never). MARS-5 total scores range from 5 to 25, and higher scores indicate better medication adherence. In line with previous studies, we used a cut-off value of 23 to define adherence: non-adherence was defined as MARS-5 scores ≤23 and adherence was defined as MARS-5 scores 24–25.^{19,20}

2.2.2 | Outcome variables

The primary outcome was CVD-related hospitalization. The secondary outcome was all-cause hospitalization. All participants were followed up for 6 months after being included in the study. Hospitalization information was obtained by making phone calls to the phone numbers provided by participants or their caregivers after 6 months. The causes of hospitalization were documented and classified as CVDrelated hospitalization or all-cause hospitalization.

2.3 | Sample size estimation

Based on the local data, we estimated that the rate of CVD-related hospitalization in older patients with chronic coronary heart disease in 6 months would be around 10%. Therefore, we estimated that at least 640 patients with coronary heart disease would be needed in this study to detect a difference in the CVD-related hospitalization rates between patients who were adherent to medication compared to those who were non-adherent (assuming a relative difference of 40% in CVD-related hospitalization rates between the two groups, with a power of 80%, one-sided test, alpha = 0.05, and allowing for 10%–12% dropout during follow-up).

2.4 | Statistical analysis

Study population characteristics are presented as mean and standard deviation (SD) for continuous variables, or frequencies and percentages for categorical variables. Comparisons in general characteristics and hospitalization rates between the adherent and non-adherent groups were conducted using chi-square tests or Fisher's exact test for categorical variables, and Student's t-tests for continuous variables. Multivariable logistic regression models were applied to examine the impact of medication adherence on CVD-related hospitalization and all-cause hospitalization. The following covariates were hypothesized to possibly have an impact on hospitalization in older people with coronary heart disease and were therefore included in the adjusted logistic regression models: age, sex, history of PCI/CABG, frailty and CVD multimorbidity. Age (in years) and frailty (the CFS score) were treated as continuous variables, and all other variables were categorical. P-values <0.05 were considered statistically significant. Data were analysed using SPSS Statistics 27.0. and R 4.3.1 (IBM. Cary, NC, USA).

3 | RESULTS

A total of 643 participants were included in this study. They had a mean age of 73.1 ± 8.3 years, 25.7% were female and 74.3% were male. Table 1 presents the participant characteristics. A majority of participants (49.0%) had completed higher education. Most of the participants were retired, and 4.4% of them were still working. The mean CFS score was 3.9, and 60.3% of the participants were classified as being frail. Polypharmacy was present in 89.6% of the participants (with a mean total number of medications of 6.7), and 65.8% had a history of PCI/CABG. Hypertension and dyslipidaemia were present in 96.9% and 95.3% of the participants, respectively. Among the cardiometabolic comorbidities, diabetes mellitus was the most prevalent (42.6%), followed by atrial fibrillation (30.1%), heart failure (15.6%), chronic kidney disease (8.0%), and ischaemic stroke (5.6%). Regarding carers, 10.6% of the participants did not have any carer, 70.6% had support from their spouse, 17.0% from their children, and 1.8% from other relatives or professional carers.

Compared to the non-adherent group, the adherent group was older (mean age 73.5 years in the adherentgroup vs. 72.0 years in the non-adherent group). The proportion of females was higher in the adherent group (28.1% vs. 17.8% in the non-adherent group, P = 0.011). The proportion having support from children was significantly higher in the adherent group compared to the non-adherent group (19.8% vs. 7.9%, P = 0.006, respectively). There was no significant difference in the prevalence of cardiovascular risk factors and cardiovascular comorbidities between the two groups, except for atrial fibrillation, which was more prevalent in the adherent group (32.8% vs. 22.4% in the non-adherent group, P = 0.015).



TABLE 1 Participant characteristics.

Characteristics	All participants $(n = 643)$	Non-adherence group $(n = 152)$	Adherence group $(n = 491)$	P-value
Age	73.1 ± 8.3	72.0 ± 7.7	73.5 ± 8.4	0.064
Age group				
60-69	255 (39.6%)	71 (46.7%)	184 (37.5%)	
70-79	237 (36.9%)	52 (34.2%)	185 (37.7%)	0.104
≥80	151 (23.5%)	29 (19.1%)	122 (24.8%)	
Sex				
Female	165 (25.7%)	27 (17.8%)	138 (28.1%)	0.011
Male	478 (74.3%)	125 (82.2%)	353 (71.9%)	
Working status				
Retired	615 (95.6%)	144 (94.7%)	471 (95.9%)	0.530
Working	28 (4.4%)	8 (5.3%)	20 (4.1%)	
Carer				
None	68 (10.6%)	20 (13.2%)	48 (9.8%)	0.006
Spouse	454 (70.6%)	118 (77.6%)	336 (68.4%)	
Children	109 (17.0%)	12 (7.9%)	97 (19.8%)	
Other	12 (1.8%)	2 (1.3%)	10 (2.0%)	
Public health insurance				
Yes	632 (98.3%)	150 (98.7%)	482 (98.2%)	0.667
No	11 (1.7%)	2 (1.3%)	9 (1.8%)	
Education (missing 31)				
Illiterate	16 (2.5%)	7 (4.7%)	9 (1.9%)	0.184
Primary school/secondary school	110 (18.1%)	22 (14.8%)	88 (19.0%)	
High school	186 (30.4%)	43 (28.9%)	143 (30.9%)	
Higher education	300 (49.0%)	77 (51.7%)	223 (48.2%)	
Body mass index				
Underweight	36 (5.6%)	7 (4.6%)	29 (5.9%)	0.291
Normal	223 (34.7%)	46 (30.3%)	177 (36.0%)	
Overweight	189 (29.4%)	44 (28.9%)	145 (29.5%)	
Obese	195 (30.3%)	55 (36.2%)	140 (28.5%)	
Smoking				
Non-smoking	327 (50.9%)	67 (44.1%)	260 (53.0%)	0.066
Current smoking	70 (10.9%)	23 (15.1%)	47 (9.6%)	
Ex-smoking	246 (32.2%)	62 (40.8%)	184 (37.5%)	
Frailty (CFS ≥4)	388 (60.3%)	92 (60.5%)	296 (60.3%)	0.958
CFS score	3.9 ± 1.3	3.8 ± 1.2	3.9 ± 1.3	0.721
Total number of medications	6.7 ± 1.8	7.2 ± 4.7	6.7 ± 3.0	0.132
Polypharmacy (using ≥5 medications)	576 (89.6%)	141 (92.8%)	435 (88.6%)	0.142
Medical history				
PCI	413 (64.3%)	102 (67.1%)	311 (63.3%)	0.397
CABG	10 (1.5%)	2 (1.3%)	8 (1.6%)	0.785
Hypertension	623 (96.9%)	150 (98.7%)	473 (96.3%)	0.145
Dyslipidaemia	613 (95.3%)	144 (94.7%)	469 (95.5%)	0.689
Diabetes	274 (42.6%)	58 (38.2%)	216 (44.0%)	0.204
Atrial fibrillation	195 (30.1%)	34 (22.4%)	161 (32.8%)	0.015
Peripheral artery disease	164 (25.7%)	45 (29.8%)	119 (24.4%)	0.183
Heart failure	100 (15.6%)	26 (17.1%)	74 (15.1%)	0.545

FIGURE 1

6 months.



TABLE 1 (Continued)

Characteristics	All participants ($n = 643$)	Non-adherence group ($n = 152$)	Adherence group (n = 491)	P-value
Chronic kidney disease	52 (8.0%)	11 (7.2%)	41 (8.4%)	0.660
Ischaemic stroke	36 (5.6%)	9 (5.9%)	27 (5.5%)	0.843
Cardiovascular multimorbidity	511 (79.5%)	113 (74.3%)	398 (81.1%)	0.073

Note: Continuous data are presented as mean ± standard deviation. Categorical data are shown as n (%).

Abbreviations: CABG, coronary artery bypass graft surgery; CFS, Clinical Frailty Scale; PCI, percutaneous coronary intervention.

TABLE 2 Distribution of the five-item Medication Adherence Report Scale (MARS-5) scores and its individual components.

		Always = 1 (n, %)	Often = 2 (n, %)	Sometimes = 3 (n, %)	Rarely = 4 (n, %)	Never = 5 (n, %)	Mean ± SD
Item 1	I forget to take my medicines	0	12 (1.9%)	117 (18.2%)	37 (5.8%)	477 (74.2%)	4.52 ± 0.85
Item 2	I alter the dose	0	3 (0.5%)	9 (1.4%)	6 (0.9%)	625 (97.2%)	4.95 ± 0.32
Item 3	I stop taking them for a while	0	4 (0.6%)	8 (1.2%)	6 (0.9%)	625 (97.2%)	4.95 ± 0.34
Item 4	I decide to miss out a dose	0	5 (0.8%)	10 (1.6%)	8 (1.2%)	620 (96.4%)	4.93 ± 0.38
Item 5	I take less than instructed	0	4 (0.6%)	15 (2.3%)	15 (2.3%)	609 (94.7%)	4.91 ± 0.41



3.1 | Medication adherence

The distribution of the MARS-5 scores and the individual components are presented in Table 2. Among the five components of the MARS-5, most of the participants answered 'sometimes' to item 1 'I forget to take my medicines'. Overall, 76.4% (491/643) were classified into the adherent group, and 23.6% (152/643) of the participants were classified into the non-adherent group.

3.2 | Hospitalization

Over 6 months of follow-up, 23.3% of the participants were admitted to hospital (22.4% in the adherent group compared to 26.3% in the non-adherent group, P = 0.319). Of these, 9.2% were due to CVD.

The CVD-related hospitalization rate was significantly higher in the non-adherent group than in the adherent group (13.8% vs. 7.7%, P = 0.023, respectively) (Figure 1).

3.3 | The relationship between adherence and hospitalization

In logistic models, medication adherence was associated with significantly reduced likelihood of CVD-related hospitalization (adjusted OR 0.48, 95% CI 0.27–0.86). A history of PCI/CABG was also associated with reduced CVD-related hospitalization (adjusted OR 0.53, 95% CI 0.29–0.94) (Figure 2).

Medication adherence was also associated with a trend of reduced all-cause hospitalization, but the difference was not 1776

Unadjusted • Adjusted

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% Cl)							
Medication adherence	0.52 (0.30, 0.92)	0.48 (0.27, 0.86)		•	-				
Age	1.01 (0.98, 1.05)	1.01 (0.97, 1.04)			•				
Sex (male vs. female)	0.70 (0.39, 1.25)	0.73 (0.39, 1.34)		-		_			
CFS score	1.16 (0.94, 1.43)	1.05 (0.82, 1.35)			-	_			
CVD multimorbidity	1.29 (0.64, 2.63)	1.01 (0.47, 2.15)		_			-		
History of PCI/CABG	0.50 (0.29, 0.86)	0.53 (0.29, 0.94)		•	_				
							1		
			0	0.5	1 Odds	1.5 Ratio	2 (OR)	2.5	3

FIGURE 2 Predictor factors for cardiovascular related hospitalization. CABG, coronary artery bypass graft surgery; CFS, Clinical Frailty Scale; CVD, cardiovascular disease; PCI, percutaneous coronary interventions.

Unadjusted • Adjusted



FIGURE 3 Predictor factors for allcause hospitalization. CABG, coronary artery bypass graft surgery; CFS, Clinical Frailty Scale; CVD, cardiovascular disease; PCI, percutaneous coronary interventions.

statistically significant (adjusted OR 0.75, 95% CI 0.49–1.15). In the adjusted model, frailty was the only independent predictor for allcause hospitalization (adjusted OR 1.19, 95% CI 1.01–1.41 for every 1-point increase in the CFS score) (Figure 3).

4 | DISCUSSION

Our study evaluated medication adherence in older people with coronary heart disease. The study contributes to the limited existing evidence on medication adherence in Vietnamese people by providing insights for the older population. Our analysis showed that a high proportion of older participants with chronic coronary heart disease in the study reported being adherent to their medications. We found an association between medication adherence and reduced CVD-related hospitalization.

Information on medication adherence is important as it contributes to patient health. Published studies on medication adherence in the Vietnamese population showed varying levels of adherence, depending on the patient cohorts, clinical settings and the instruments

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used to measure and define adherence.^{12–15} While most previous studies on medication adherence in Vietnam recruited younger participants (age ranged from 53 to 63),^{12–15} the results of our study provide insights into medication adherence among an older population cohort. Vietnam is going through an epidemiological transition, with a growing number of older people. The older population typically requires increased utilization of healthcare resources due to their more significant health needs. Therefore, the findings of our study can provide valuable guidance for developing health policies and plans at a population level, particularly in settings where resources are limited.

Our results showed that medication adherence was associated with reduced CVD-related hospitalizations, but not all-cause hospitalizations. The risk of CVD-related hospitalization was reduced by half in the adherent group compared to the non-adherent group in our study. This finding is in line with observations from studies worldwide. In a systematic review on the impact of medication adherence on coronary heart disease costs and outcomes conducted by Bitton and colleagues, the authors found that high adherence was significantly associated with reduced coronary artery disease-related events, mortality, readmissions and annual costs for secondary prevention of coronary artery disease.²¹ CVDs continue to be a significant source of burden of disease on health systems in low- to middle-income countries like Vietnam.²² The observed reduction in CVD-related hospitalization among older patients with coronary heart disease who adhered to their cardiovascular medications is likely due to the effectiveness of these medications in managing their heart condition. By controlling key risk factors and reducing symptoms, these medications can prevent CVD events which lead to hospitalizations. The discrepancy in the relationship between medication adherence and CVD-related hospitalization compared to allcause hospitalization can have several explanations. Firstly, the study was powered to detect differences in CVD-related hospitalizations in individuals who adhered to cardiovascular medications compared to those who did not, rather than all-cause hospitalizations. In addition, in this study the focus on medication adherence specifically referred to cardiovascular medications. Given that the study population are patients with coronary heart disease, it is logical that adherence to cardiovascular medications would reduce their risk of CVD-related hospitalizations, but not necessarily reduce hospitalizations due to other causes such as infection, injuries or non-CVD chronic diseases. Further studies in Vietnam are needed to explore the impact of medication adherence on all-cause hospitalizations in this population. The growing impact of CVD on health systems shows the need for more steps to be taken to help manage this. Pharmacotherapies continue to play essential roles in managing coronary heart disease in older people and as such, medication adherence should be an integral part of broader management strategies. Importantly, medication adherence is a modifiable behavioural risk factor that can be targeted for intervention. There is a pressing need for innovative and evidence-based strategies to enhance medication adherence in older patients with coronary heart disease in Vietnam. In our study, there was a significant prevalence of non-intentional non-adherence (due to forgetfulness). This finding indicates a need for further

intervention studies incorporating strategies such as sending reminders to those who forget their pills, using pillboxes, or maintaining a calendar of medication use to improve adherence. Association of medication adherence with major adverse cardiovascular events also has implications for healthcare costs, which is a major challenge for policymakers in resource limited settings. As the management of CVD involves high utilization of healthcare resources, focusing on medication adherence as a modifiable patient factor becomes a possible focus point when planning cost-effective strategies for managing CVD.

Exploring factors for non-adherence could also potentially reduce unnecessary hospital readmission rates. Considering the broader level impact of medication adherence, more studies should be done to explore factors influencing medication adherence in Vietnam, particularly in the older population. Older patients with coronary heart disease are more likely to experience multiple chronic conditions and polypharmacy, making it challenging to adhere to complex medication regimens. In addition, physiological changes associated with ageing, such as cognitive decline and physical limitations, can also impact medication adherence in older individuals, especially those living in low- and middle-income countries.^{23,24} Patients in low- and middleincome countries have added barriers compared to patients in highincome or developed countries. Examples of these barriers may include limited access to medicines, varying educational backgrounds affecting health literacy levels, and resources to support medication adherence. A recent systematic review of factors that can influence medication adherence of adults with chronic diseases found that socioeconomic status and social support might have a positive impact on adherence.²⁵ In patients taking long-term medicines for CVD prevention, their perception of health goals may affect medication adherence.²⁶ In low- and middle-income countries, poor medication adherence has also been influenced by a lack of knowledge, negative beliefs and negative attitudes.²⁴ Simplified regimens, like the use of single-pill combinations, might be of particular interest in such settings, as recently demonstrated for arterial hypertension in Africa.^{27,28} As young and old patients may have different perceptions of health goals, further studies could be done to explore specific reasons for non-adherence in older patients with coronary heart disease. Further studies could also be conducted to explore the relationship of educational background, its impact on health literacy and its relationship with factors experienced by the older population such as frailty and polypharmacy.

To the best of our knowledge, this was the first study to examine medication adherence in older people with chronic coronary syndrome in Vietnam. Additionally, our study was conducted at Thong Nhat Hospital, one of the largest hospitals in Vietnam with specialized services for older patients, which enabled the collection of data for older people with complex medication management plans. Our study also reported the relationship with hospitalization rates, an outcome that is not routinely reported in studies on medication adherence. With the growing population of older people coupled with the growing burden of CVDs, factors that can influence hospitalization rates should be considered for healthcare planning. 78 BICP BRITISH PHARMACOLOGICA SOCIETY

However, our study has several limitations. The study was conducted on older patients attending outpatient clinics from one hospital, so it may not accurately reflect all older people with coronary heart disease in Vietnam. There was a high proportion of achieving higher education among our study participants, which may explain the high proportion of medication adherence observed in this study. In addition, the high medication adherence rate observed might have been influenced by patients' awareness of being part of a study. Our follow-up duration was only 6 months, and we did not re-assess medication adherence at the end of follow-up. Further studies with larger sample sizes and longer follow-up periods are needed to understand the impact of medication adherence on adverse outcomes and quality of life in older patients with coronary heart disease.

5 | CONCLUSION

This study showed a positive relationship between medication adherence and reduced risk of CVD-related hospitalization in older people with coronary heart disease. Our study highlights the important role of medication adherence in improving health outcomes for older people with coronary heart disease. There is a need to better understand the reasons why patients are non-adherent to their medicines, particularly in different contexts and specific populations. Contextualized strategies would be useful to help improve adherence and potentially reduce unnecessary hospitalization rates. Healthcare providers should consider incorporating adherence assessment into the long-term care for older patients with coronary heart disease.

AUTHOR CONTRIBUTIONS

Tan Van Nguyen is the principal investigator (PI) and oversaw the study. Tan Van Nguyen and Tu Ngoc Nguyen led the study concept and study design and wrote the first draft of the manuscript. Tan Van Nguyen, Hang Thi Thuy Nguyen, Dung Ngoc Truong, Viet Quoc Nguyen, Huy Quang Nguyen and Huy Quoc Nguyen led ethics application, recruitment and data acquisition. All authors were involved in analysis and interpretation of data and revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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