



Medication Adherence, Quality of Life, and Rehospitalization in Post-Acute Coronary Syndrome Patients

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Abstract

Background: Post-ACS patients often face an increased likelihood of mortality, rehospitalization, and diminished quality of life as a consequence of poor medication adherence. **Objective:** This study aimed to evaluate the level of adherence to medication in post-ACS patients and its relationship with quality of life and rehospitalization rates. **Methods:** A cross-sectional, observational, single-center, prospective study conducted at Universitas Airlangga Teaching Hospital, Surabaya. Compliance with medication was evaluated using the Adherence Refill Medication Scale-7 (ARMS-7) questionnaire, while quality of life was measured using the Short Form-36 (SF-36) Quality of Life questionnaire. Rehospitalization rates were obtained through direct interviews and medical record observations within 45 days of hospital discharge. **Results:** In total, 39 patients participated in this study, with overall adherence rates of 35.89% for all prescribed medications, 53.85% for antiplatelets, 38.46% for statins, 55.56% for beta-blockers, and 58.06% for ACEIs/ARBs. Among the quality-of-life dimensions, social functioning had the highest score (93.01 ± 15.89), whereas physical role functioning had the lowest score (40.39 ± 35.18). Within 45 days of hospital discharge, 26% of the patients experienced rehospitalization. Statistical analysis indicated a positive correlation between adherence to all prescribed medications and physical role functioning in relation to QoL ($p = 0.038$). In addition, overall medication adherence was negatively correlated with the risk of rehospitalization ($p = 0.019$). **Conclusion:** Total medication adherence was associated with improved physical function and rehospitalization events. Providing education can lead to better therapeutic outcomes, improved quality of life, and reduced rehospitalization in patients.

Keywords: acute coronary syndrome, medication adherence, quality of life, rehospitalization

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INTRODUCTION

Acute Coronary Syndrome (ACS), such as Unstable Angina (UA) and Myocardial Infarction (MI), is a manifestation of ischemic cardiovascular conditions, which are among the primary contributors to fatal cardiovascular outcomes. According to data reported by the Global Burden of Disease (GBD), this condition accounts for approximately 49.2% of deaths. The 2019 GBD data also reported that 197 million patients worldwide were diagnosed with ischemic cardiovascular conditions, with approximately 5% of these cases leading to death. Other reports show that one American experiences an MI every 40 s, with 109,199 deaths recorded annually (Tsao et al., 2023). Data from the Jakarta Acute Coronary Syndrome (JAC) Registry showed that non-ST-elevation acute coronary syndrome was detected in 1223 patients in 2013, 1915 patients in 2007, and 1925 patients in 2010 (Yusniawati et al., 2018).

Individuals diagnosed with ACS often face an elevated likelihood of mortality, rehospitalization, and a decline in quality of life (Oliveira et al., 2019; Dou et al., 2022). According to research on ACS patient rehospitalization in Indonesia, the rehospitalization rate for ACS patients was approximately 36.7%. Medical issues and patient education impacted this incident. (Romalina et al., 2018). A study at Hasan Sadikin Central Hospital in Bandung indicated that 48% of patients with acute coronary syndrome experienced a diminished quality of life significantly associated with the physical domain (Nurhamsyah et al., 2021). These adverse outcomes can be prevented by ensuring proper implementation of post-ACS therapeutic management. Pharmacological and non-pharmacological treatments are typically used to manage post-ACS patients. As outlined in the 2020 European Society of Cardiology (ESC) recommendations, the primary classes of medications recommended for pharmacological therapy include antiplatelets, statins, and beta-blockers (Collet et al., 2021). In addition, angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) are also suggested for individuals diagnosed with ACS and heart failure (O'Gara et al., 2013). Since post-ACS treatment is a long-term therapy, medication adherence is a major factor influencing the effectiveness of cardiovascular treatment (Bansilal et al., 2016; Shang et al., 2019).

Several studies have concluded that poor compliance with prescribed medications is a key factor affecting the success of efforts to prevent rehospitalization and the decline in quality of life

(Zhang et al., 2014; Suhail et al., 2021; Thomson et al., 2020). In Indonesia, studies on post-ACS patients are very limited, particularly regarding the association between adherence to medication and treatment results, such as rehospitalization rates and quality of life. Therefore, this study aimed to investigate the correlation between adherence to prescribed medications and QoL in post-ACS patients receiving treatment at the Cardiology Clinic of Universitas Airlangga Hospital (RSUA) in Surabaya.

MATERIALS AND METHODS

Materials

The inclusion criteria were individuals aged ≥ 18 years who had received a diagnosis of Non-ST-Elevation Acute Coronary Syndrome (NSTEMI) or ST-Elevation Myocardial Infarction (STEMI), were discharged from the hospital, and attended follow-up visits at the Cardiology Clinic of Universitas Airlangga Hospital. Patients who consented to participate and whose caregivers were literate and had no communication difficulties were included in the study. The exclusion criteria included patients with unknown history of rehospitalization.

Tools

Complications with medication were assessed using the Adherence to Refill Medication Scale-7 (ARMS-7) questionnaire. The ARMS-7 scale followed a 4-point Likert-type rating, consisting of four response options: "Never" (1 point), "Sometimes" (2 points), "Often" (3 points), and "Always" (4 points). The total score ranged from 7 to 28, with a lower score indicating better adherence. In this study, adherence was categorized into adherent and non-adherent groups; those who scored exactly 7 were classified as adherent, while those who scored greater than 7 were classified as non-adherent. The ARMS-7 questionnaire has undergone validity and reliability testing with $r=0.906$ and was considered good with Cronbach's $\alpha > 0.72$. Overall quality of life was evaluated using the Short Form-36 (SF-36) Quality of Life Questionnaire, which consists of eight dimensions covering both physical and mental aspects. The questionnaire included 36 items evaluating the following dimensions: physical capability (10 questions), role limitations due to physical conditions (4 questions), bodily discomfort (2 questions), perceptions of general health status (6 questions), social interactions (4 questions), role limitations due to emotional challenges (3 questions), vitality (2 questions), and mental health (5 questions). All dimensions were scored on a scale ranging from 0 to 100, with higher values

reflecting improved overall medication adherence. The internal consistency of the Indonesian version of the SF-36 questionnaire, measured using Cronbach's alpha, was rated as good, with a value of >0.70 .

Method

Study design and data collection

This non-interventional, single-center, prospective, cross-sectional study was conducted at Universitas Airlangga Hospital (RSUA), Surabaya, from June to August 2023. The independent variable in this study was patient medication adherence. The dependent variables were patients' quality of life and the incidence of rehospitalization. The sample was collected prospectively using a quantitative approach that required numerical data. In addition, the cross-sectional

data collection method was used, suggesting that data were obtained at a specific time to analyze patient compliance with prescribed medications and overall quality of life. Rehospitalization was assessed through direct interviews and a review of medical records 37–45 days post-hospitalization.

RESULTS AND DISCUSSION

Sociodemographic characteristics data

A total of 39 patients fulfilled the eligibility requirements and consented to participate in this study. The sociodemographic attributes and clinical data of the study participants are displayed in Table 1.

Table 1. Sociodemographic characteristics and clinical data of patients with ACS

Variables	Total (n=39)	Adherent* (n=14)	Non-adherent* (n=25)	p-value
Age, years (mean $\pm$ SD)	56,43 $\pm$ 12,90	54,29 $\pm$ 13,19	57,64 $\pm$ 12,85	
Age range n (%)				0,443 ^a
- $\leq$ 50 years	11 (28,21)	5 (35,71)	6 (24)	
- $>$ 50 years	28 (71,79)	9 (64,29)	19 (76)	
Gender n (%)				
- Male	22 (56,41)	9 (64,29)	13 (52)	0,458 ^c
- Female	17 (43,59)	5 (35,71)	12 (38)	
Marriage status n (%)				
- Married	29 (74,36)	12 (85,71)	17 (70,83)	0,279 ^d
- Widow/Widower	10 (25,64)	2 (14,29)	8 (29,17)	
Occupation n (%)				
- None/retired	25 (64,10)	10 (71,43)	15 (60)	0,807 ^c
- Private worker	9 (23,08)	3 (21,43)	9 (36)	
- Entrepreneur	4 (10,26)	1 (7,14)	3 (12)	
- Civil servant/police	1 (2,56)	0	1 (4)	
Education level n (%)				
- Primary	10 (25,64)	2 (14,38)	8 (32)	0,308 ^c
- Middle high	6 (15,38)	4 (28,57)	2 (8)	
- High school	12 (30,77)	4 (28,57)	8 (32)	
- University	11 (28,21)	4 (28,57)	7 (28)	
BMI (mean $\pm$ SD)	25,02 $\pm$ 3,94	25,28 $\pm$ 3,84	24,87 $\pm$ 4,06	
BMI Status n (%)				
- Underweight	3 (7,7)	1 (7,14)	2 (8)	0,756 ^a
- Normal weight	18 (46,2)	6 (42,86)	12 (38)	
- Overweight	13 (33,3)	5 (35,71)	8 (32)	
- Obesity	5 (12,8)	2 (14,29)	3 (12)	
Comorbidity n (%)				
- Hypertension	29 (74,36)	10 (71,43)	19 (76)	1,000 ^d
- Diabetes Mellitus	12 (30,77)	4 (28,57)	8 (32)	1,000 ^d
- Dyslipidemia	9 (23,08)	3 (21,43)	6 (24)	1,000 ^d
- Heart failure	21 (53,85)	7 (50)	14 (56)	0,718 ^c
Diagnosis on discharged n (%)				
- Unstable angina	16 (41,03)	5 (35,71)	11 (44)	0,854 ^c
- NSTEMI	16 (41,03)	6 (42,86)	10 (40)	0,854 ^c
- STEMI	7 (17,94)	3 (21,43)	4 (16)	0,854 ^c
History of Stent Insertion n (%)				
- Yes	19 (48,72)	10 (71,43)	9 (36)	0,034 ^c
- No	20 (51,28)	4 (28,57)	16 (64)	0,034 ^c

Variables	Total (n=39)	Adherent* (n=14)	Non-adherent* (n=25)	p-value
Disease duration n (%)				
- ≤ 1 year	27 (69,23)	12 (85,71)	15 (60)	0,151 ^d
- > 1 year	12 (30,77)	2 (14,49)	10 (40)	0,151 ^d
Smoking history				
- Yes	22 (56,41)	9 (64,29)	13 (52)	0,458 ^c
- No	17 (43,59)	5 (35,71)	12 (48)	0,458 ^c

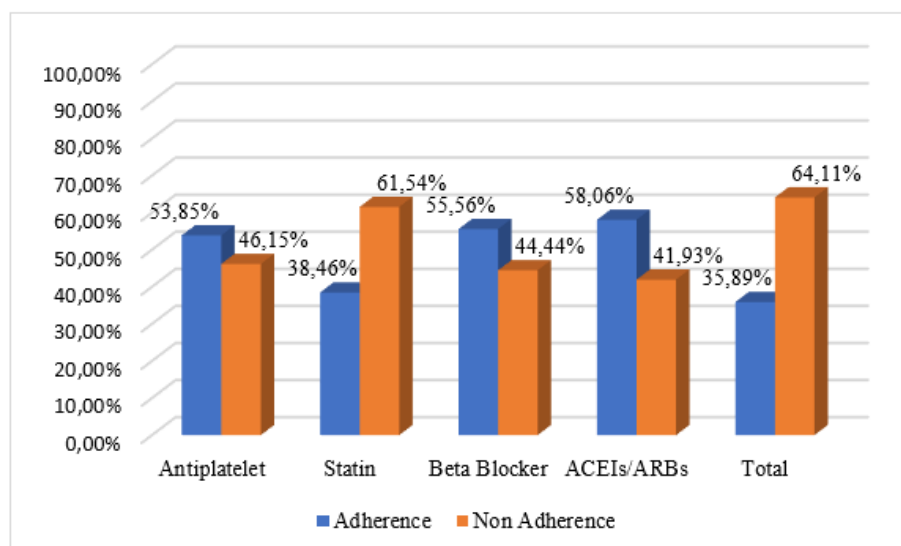


Figure 1. Medication adherence data of post-acute coronary syndrome patients based on the arms questionnaire

Among the patients who agreed to participate, 56.41% were male and 43.59% were female. The average patient age was 56.43 ± 12.90 years, with the oldest being 87 years and the youngest 31 years. A total of 29 participants (74.36%) were married, while 10 (25.64%) were widowed or divorced. The highest level of education attained was high school (30.77%), followed by higher education (28.21%), while the remaining patients had completed only elementary or middle school education. In addition, the majority of patients (64.1%) were retired, while the rest were employed.

The most common diagnosis at hospital discharge was NSTEMI or Unstable Angina (UA), affecting 16 patients (41.03%), while only a small proportion were diagnosed with STEMI (17.94%). Approximately 90% had comorbidities, with hypertension being the most prevalent (74.36%). In addition, 12 participants (30.77%) had a history of diabetes mellitus, and 9 (23.08%) had a history of dyslipidemia. A total of 21 patients (53.85%) also had other heart diseases, particularly heart failure. Regarding BMI classification, the majority had an ideal BMI (46.2%), while 33.3% were overweight, 12.8% were obese, and 7.7% were underweight. The duration of heart disease was ≤ 1 year

in most patients (69.23%, 27 patients), while 30.77% (12 patients) had heart disease for more than 1 year. More than 50% of the participants were former smokers (56.4%), 19 (48.72%) had undergone stent placement, and 20 had not undergone or were not scheduled for stent placement.

Medication adherence data based on the adherence to refills and medications scale (arms) questionnaire

This study showed that the overall patient adherence rate was 35.89%. The adherence rates for specific medication classes were as follows: 53.85% for antiplatelet therapy, 38.46% for statin therapy, 55.56% for beta-blockers, and 58.06% for ACEIs/ARBs (Figure 1). Non-adherence across all medication categories is displayed in Table 2. The primary reason for non-adherence, based on the adherence to refill indicator, was running out of medication stock (25.6%). The most common cause of non-adherence, based on the adherence to medication indicator, was forgetting to take the medication (25.6%).

Quality of life assessment data based on the short-form 36 (sf-36) questionnaire

The overall well-being of the patients in this study was obtained from structured interviews using the SF-36 questionnaire. Table 3 outlines the distribution of

patients' QoL data, showing that patients had the highest level of medication adherence in the social interaction dimension, with an average score of 93.01 ± 15.89 . The lowest-scoring dimension was physical role limitation, with an average score of 40.39 ± 35.18 .

Rehospitalization incidence in post-acute coronary syndrome patients

After a 45-day observation period following hospital discharge, data showed that 10 patients (26%)

were readmitted due to a cardiovascular disease event, whereas the remaining 29 (74%) did not experience rehospitalization (Figure 2). The primary diagnoses associated with rehospitalization included Acute Coronary Syndrome (ACS), Acute Decompensated Heart Failure (ADHF), and a combination of ADHF and ACS.

Table 2. Frequency distribution of arms questionnaire total adherence items

n = 39 Patients						
Question Number	Question	Never	Sometimes	Often	Always	Average score
Indicator: Adherence to Refill (Compliance in Refilling Prescriptions)						
3	How often do you forget to refill your heart medication prescription? (Unintentional)	33 (94,6%)	4 (10,3%)	1 (2,6%)	1 (2,6%)	1,23±0,63
4	How often do you run out of your heart medication? (Intentional)	21 (53,8%)	10 (25,6%)	7 (17,9%)	1 (2,6%)	1,69±0,86
7	How often do you plan and refill your heart medication prescription before it runs out? (Intentional)	1 (2,6%)	3 (7,7%)	3 (7,7%)	32 (82,1%)	1,31±0,73
Indicator: Adherence to Medication (Compliance in Taking Medication)						
1	How often do you forget to take your heart medication? (Unintentional or conscious)	22 (56,4%)	10 (25,6%)	6 (15,4%)	1 (2,6%)	1,64±0,84
2	How often do you decide not to take your heart medication? (Intentional)	34 (87,2%)	0 (0%)	4 (10,3%)	1 (2,6%)	1,28±0,76
5	How often do you skip taking your heart medication when you feel better? (Intentional)	32 (82,1%)	4 (10,3%)	2 (5,1%)	1 (2,6%)	1,28±0,69
6	How often do you skip taking your heart medication when you still feel unwell? (Intentional)	36 (92,3%)	1 (2,6%)	1 (2,6%)	1 (2,6%)	1,69±0,86

Table 3. Quality of life data based on the sf-36 questionnaire

Dimension of SF-36 (Scores = 0-100)	Mean N = 39 patients	Standard Deviation
Physical Function	65,13	26,94
Physical Role	40,39	35,18
Pain	72,69	37,01
General Health	62,82	18,54
Social Function	93,01	15,89
Emotional Well-being	56,84	31,47
Vitality	77,86	18,21
Mental Health	79,59	17,79

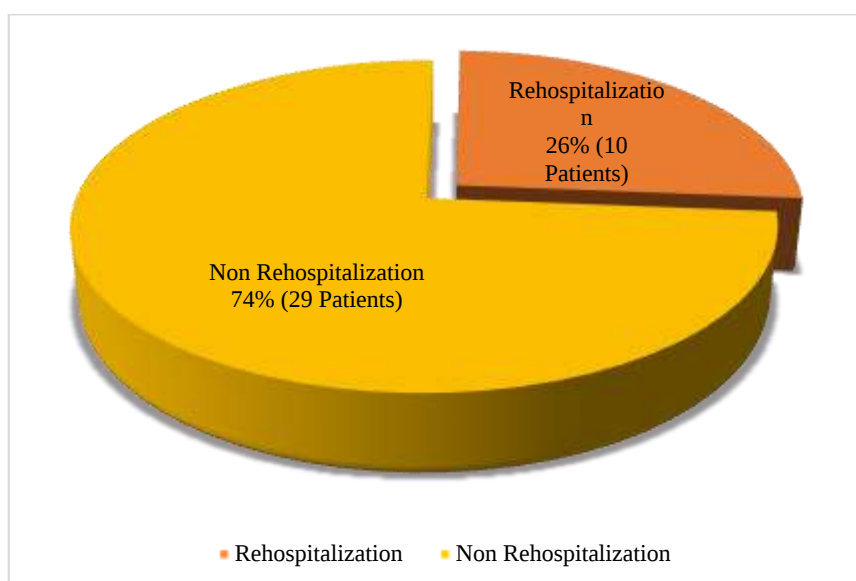


Figure 2. Rehospitalization incidence in post-acute coronary syndrome patients

Table 4. Analysis of the association between medication adherence and quality of life in patients post-acute coronary syndrome at the cardiology clinic of UNAIR Hospital

Quality of life Dimension	Adherent (Mean ± SD)	Non-Adherent (Mean ± SD)	p-value
Total of Adherence (n=39)			
Physical Function	68,93±18,73	63±30,75	0,758 ^b
Physical Role	55,36±32,75	32±34,25	0,046 ^b
Pain	71,96±24,24	73,1±28,92	0,590 ^b
General Health	63,89±18,54	62,15±18,91	0,628 ^b
Social Function	93,33±17,59	92,81±15,31	0,451 ^b
Emotional Well-being	59,52±32,49	55,33±31,45	0,737 ^b
Vitality	81,79±15,39	75,67±19,56	0,375 ^b
Mental Health	79,42±17,17	79,68±18,47	0,917 ^b

Table 5. Analysis of the association between medication adherence and rehospitalization in patients post-acute coronary syndrome at the cardiology clinic of UNAIR Hospital

Adherence Level	No Rehospitalization	Rehospitalization	Total	p-value (CI 95%)
Total Adherence (n=39)				
Non-Adherent (%)	22 (88%)	3 (12%)	24 (100%)	0,019 ^d
Adherent (%)	7 (50%)	7 (50%)	15 (100%)	(1,484-36,239)
Total (%)	29 (74,4%)	10 (25,6%)	39 (100%)	

Analysis of the association between medication adherence and quality of life in patients post-acute coronary syndrome

Bivariate analysis revealed a significant relationship between total medication adherence and the physical role limitation dimension of well-being ($p = 0.038$). The average score in the physical role limitation dimension was greater in patients who adhered to their medication regimen than in those who did not (Table 4).

Analysis of the association between medication adherence and rehospitalization in patients post-acute coronary syndrome

The relationship between total adherence and rehospitalization was analyzed using the bivariate

Fisher's Exact Test. In addition, the bivariate analysis results in Table 5 indicate a significant association between total treatment adherence and rehospitalization ($p = 0.019$).

Analysis of the association between drug category and rehospitalization in patients post-acute coronary syndrome

The relationship between each medication category and rehospitalization was analyzed using the bivariate Fisher's Exact Test. The results of the bivariate analysis in Table 6 show no significant relationship between each medication and rehospitalization ($p > 0.05$). The statin group could not be tested because all patients were using statins; therefore, there was no comparison group.

Table 6. Analysis of the association between drug category and rehospitalization in patients post-acute coronary syndrome at the cardiology clinic of UNAIR Hospital

Drug Category (n (%))	Rehospitalization	No Rehospitalization	Total	<i>p-value</i>
Beta Blocker				
No (n (%))	0	2 (100%)	2 (100%)	1.000 ^d
Yes (n (%))	10 (27 %)	27 (73%)	37 (100%)	
Total (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	
ACEi/ARB				
No (n (%))	0	8(100%)	8 (100%)	0.086 ^d
Yes (n (%))	10 (32.3%)	21 (67.7%)	31 (100%)	
Total (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	
Statin				
No (n (%))	0	0	0	.
Yes (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	
Total (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	
CYP Inhibitor				
No (n (%))	2 (14.3%)	12 (85.7%)	14 (100%)	0.279 ^d
Yes (n (%))	8 (32.0%)	17 (68.0%)	25 (100%)	
Total (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	
ASA				
No (n (%))	1 (50%)	1 (50%)	2 (100%)	0.452 ^d
Yes (n (%))	9 (24.3%)	28 (75.7%)	37 (100)	
Total (n (%))	10 (25.6%)	29 (74.4%)	39 (100%)	

Notes:^a Statistical test conducted using the independent t-test^b Statistical test conducted using the Mann-Whitney test^c Statistical test conducted using the Chi-square test^d Statistical test conducted using Fisher's Exact Test**Discussion**

An analysis of medication adherence concerning QoL and rehospitalization was conducted on post-ACS participants at the Cardiology Outpatient Clinic of RSUA. Rehospitalization events were observed 37–45 days after hospital discharge. In addition, medication adherence and quality of life assessments were conducted through structured interviews using the ARMS-7 and SF-36 questionnaires, which were validated for their reliability. In total, 39 patients participated in this study.

The average age of the patients was 56.43±12.9 years, ranging from 31 to 87 years, with 28.21% being under 50 years old. These findings were consistent with studies in Indonesia reporting an average ACS patient age of 56.9±11.7 years, as well as European studies showing that 26.3% of ACS patients were < 50 years old (Adam et al., 2021; Zanchin et al., 2022). Most patients were men (56.4%), married (74.4%), and unemployed or retired. In addition, the majority of patients had a high school education (30.8%), followed by university graduates (28.2%), and 25.64% had only completed primary education. Several studies conducted in Indonesian hospitals also reported that ACS was more prevalent in men than in women (Adam et al., 2021;

Qothi et al., 2021; Pramudyo et al., 2022). European reports have shown that married patients exhibit better physical and social QoL (Lisiak et al., 2016). Other studies have indicated that patients with low incomes experienced more frequent rehospitalization and that employment status influenced ACS patients' overall quality of life, especially regarding physical function, emotional well-being, and general health. Most patients had an ideal BMI (46.2%). A multicenter study by Pocock et al. (2021) reported that obese patients had lower well-being scores than individuals with ideal body weight (Pocock et al., 2021).

As many as 89.7% of the patients (35 participants) had comorbidities, with hypertension being the most prevalent (74.36%), followed by heart failure and diabetes. Hypertensive patients have twice the risk of ACS compared to those without hypertension, due to high blood pressure causing vascular damage through oxidative and mechanical stress (Rathore, 2018). These comorbidities have been linked to 30-day rehospitalization events and a decline in quality of life (Tsoulou et al., 2023; Hess et al., 2016). At hospital discharge, 41.03% of the patients were diagnosed with NSTEMI and UA, with 16 and 19 participants (48.7%) having undergone percutaneous coronary intervention

(PCI). Studies have indicated that patients with UA experience reduced well-being and an increased likelihood of rehospitalization (Aljabery et al., 2022; Rathore, 2018). Tripathi et al. and Tsoulou et al. suggested that patients with ACS who underwent PCI exhibited improved overall quality of life and lower rehospitalization rates within 30 days post-discharge (Tripathi et al., 2019; Tsoulou et al., 2023). In addition, 56.4% of patients had a history of smoking, which exacerbated heart disease severity by increasing the risk of MI and early atherosclerosis, influencing rehospitalization rates (Oliveira et al., 2019; Rathore, 2018).

This study aimed to analyze post-ACS patients' medication adherence to antiplatelets, statins, beta-blockers, and ACEIs/ARBs, as illustrated in Figure 1. The overall medication adherence rate among patients with ACS was 35.89%. This percentage was lower than that in studies conducted in developed countries such as the United States (U.S.) and Germany, where ACS patients' adherence to all cardiovascular medications exceeded 70% (Goss et al., 2017; Mathews et al., 2018). Several factors contributed to the discrepancy in adherence rates between this study and previous studies, such as (1) differences in healthcare systems, where hospitals in developed countries provided higher-quality services, leading to better patient outcomes; (2) limited healthcare infrastructure in Indonesia, where logistical challenges and insurance coverage barriers hindered adherence; and (3) education and health literacy levels, as 25.64% of patients had only completed primary education, and lower health literacy was associated with poorer medication adherence. A study in the U.S. reported that hospitals with high-quality services correlated with better patient adherence to follow-ups and treatments, thereby improving clinical outcomes (Mathews et al., 2018). Higher health literacy enables patients to better understand and follow medical instructions, leading to improved adherence (Luu et al., 2019).

The ARMS questionnaire identified whether non-adherence was due to patient behavior in taking medications or filling prescriptions. Questions 1, 2, 5, and 6 assessed medication-taking behavior, and questions 3, 4, and 7 evaluated prescription-filling behavior. The primary reason for non-adherence to medication was that patients forgot to take their medications. In terms of prescription filling, the major reasons for non-adherence were running out of medication and failing to attend follow-up appointments. These findings were consistent with

previous studies identifying forgetfulness and missed follow-ups as major adherence barriers for patients with ACS. Other reasons for non-adherence included forgetting to take medication due to a lack of reminders from family, forgetting midday doses due to work, stopping medication due to the absence of symptoms, and discontinuing medication due to boredom without consulting healthcare providers. Stopping medication due to unpleasant side effects, receiving atorvastatin for only 7 days, and follow-up appointments being delayed beyond 30 days due to hospital holiday schedules were also factors of non-adherence.

The next variable examined was rehospitalization due to cardiovascular events. The 37 to 45-day rehospitalization rate for post-ACS patients at RSUA's Cardiology Clinic was 26% (Figure 2), consistent with Asian studies reporting rehospitalization rates exceeding 25% (Karim et al., 2018). However, this percentage was higher than the ACS rehospitalization rate in the U.S., which was recorded at less than 20% over a 30-day observation period (Rymer et al., 2019). In this study, a correlation was found between total medication adherence and rehospitalization during the 45-day observation period ($p = 0.019$). This finding contrasts with those of previous studies, which concluded that high medication adherence reduces rehospitalization in patients with ACS (Murad et al., 2022). Bivariate analysis was conducted to evaluate the relationship between medication categories and the incidence of rehospitalization in patients with post-acute coronary syndrome. Based on the test results, no statistically significant relationship was found between medication use and rehospitalization ($p > 0.05$). These findings suggest that drug category did not represent a confounding factor for the incidence of rehospitalization in this study.

In addition to adherence and rehospitalization events, another variable observed in this study was the patients' overall QoL. The quality of life of post-ACS patients was measured using the Short-Form 36 (SF-36) questionnaire, which has been widely applied to evaluate quality of life among patients with chronic diseases, including ACS, across various dimensions, such as physical capability, physical role, bodily discomfort, general health, social interactions, emotional role, vitality, and mental health. In this study, the score for each dimension in the SF-36 varied between 0 and 100, with higher scores reflecting greater medication adherence.

The physical function dimension scored 65.13 ± 26.94 , reflecting the patients' ability to perform daily

activities. This finding is consistent with a study conducted in Greece involving patients with ACS undergoing PCI (Tsoulou et al., 2023). The physical role dimension, with a score of 40.39 ± 35.18 , indicated limitations in the patients' activities due to a decline in physical health. Previous studies also reported that the physical role dimension score during the 30-day post-ACS period was 40.3 (de Carvalho Costa et al., 2022). The pain dimension scored 72.69 ± 37.01 , which was consistent with prior studies on patients with STEMI 6 months after undergoing PCI (Tsoulou et al., 2023). In addition, the general health dimension scored 62.82 ± 18.54 , which was higher than the findings of a study in Brazil that reported a lower general health score in ACS patients. This dimension evaluates patients' overall perception of their health and their belief in whether their health has improved or worsened (de Carvalho Costa et al., 2022). The emotional role dimension in this study scored 56.84 ± 31.47 , consistent with previous studies. This dimension reflects the emotional impact on the patients' work or other activities (Tsoulou et al., 2023; de Carvalho Costa et al., 2022). The vitality dimension scored 77.86 ± 18.21 , which is better than that reported in previous studies. This dimension illustrates the extent to which patients feel energetic in their activities or how frequently they feel fatigued while working (Tsoulou et al., 2023; de Carvalho Costa et al., 2022; Serrano-Rosa et al., 2021). The social interaction and mental health dimensions achieved the highest scores (93.01 ± 15.89 and 79.59 ± 17.79 , respectively). Previous studies have also noted that patients experiencing their first hospitalization had the highest overall QoL scores in the social interactions and mental health dimensions (Anchah et al., 2017; de Carvalho Costa et al., 2022).

The statistical test results in Table 4 indicate a variation in overall QoL scores between adherent and non-adherent patients. Patients who adhered to their treatment generally exhibited a better overall quality of life than those who were less adherent. Total medication adherence was significantly correlated with overall QoL scores in post-ACS patients ($p = 0.046$). This finding is aligned with research on ACS patients at a teaching hospital in Bandung, which concluded that medication adherence in post-ACS patients was related to overall QoL (p -value = 0.009) (Ramadhan et al., 2022). Similarly, a study in Korea stated that overall patient adherence to medication enhanced the overall quality of life. This is because patients who complied with treatment also tended to follow lifestyle changes, including adhering to a low-fat, low-sodium diet,

participating in regular physical exercise, and managing stress, which ultimately affected their quality of life (Lee et al., 2018).

In this study, those who were more adherent to their overall treatment had higher scores in the physical role dimension than non-adherent patients (55.36 ± 32.75 vs. 32 ± 34.25 ; $p = 0.046$). Adherence to prescribed medications was linked to the benefits received by patients. Regular medication intake reduces the risk factors for ACS and prevents major adverse cardiovascular events (MACE), including rehospitalization due to recurrent ACS episodes or other cardiovascular events, thereby improving the patients' quality of life (Suhail et al., 2021; Murad et al., 2022; Lee et al., 2018). Furthermore, no significant relationship was found between medication adherence and the bodily discomfort dimension of patients' overall QoL. The pain dimension reflects the extent to which patients experience pain and whether any activities are restricted. Patients with ACS who experienced MACE, including recurrent attacks or relapses. The intensity and recurrence of pain in patients are influenced not only by medication adherence but also by various factors, including diabetes, disease severity, left ventricular dysfunction, and patients who have undergone PCI (Sadmi et al., 2013; Vafaie et al., 2020).

In this study, most patients reported that their pain intensity significantly decreased after receiving treatment, both in the adherent and non-adherent groups. Consequently, there was no significant difference in pain dimension scores between the two groups. Another possible explanation for this result is that some patients had already undergone PCI. Patients who had undergone PCI tended to experience significantly less pain than before, even when they were less adherent to their medication (Pujowaskito et al., 2021). The SF-36 quality-of-life questionnaire was used in this study to assess general pain rather than the frequency of heart attacks experienced by patients, unlike the Seattle Angina Questionnaire (SAQ).

This study presents several novelties compared to other studies in Indonesia. First, it analyzed both total medication adherence and adherence by drug category in post-ACS patients, allowing for the identification of adherence levels for each drug class and providing a foundation for developing educational strategies focused on improving medication adherence in post-ACS patients. Second, in addition to identifying patient issues through questionnaires, this study presented data on patient-reported barriers to taking or refilling medications. These findings could serve as a reference

for pharmacists to address medication adherence barriers. Finally, this study provided insights into the association between adherence to medication, rehospitalization, and QoL among post-ACS patients, which has not been widely studied in Indonesia.

The main limitation of this study was the use of a generic quality-of-life questionnaire. While this questionnaire has been extensively applied to assess overall medication adherence in various chronic diseases, it was not specifically developed to assess the overall quality of life in coronary artery disease patients with CAD. For instance, it did not capture the frequency of relapses in patients with post-ACS. In addition, the sample size was smaller compared to similar studies. Owing to the short duration of this study, a long-term cohort study is recommended to assess adherence over multiple observation points over time.

CONCLUSION

The overall rate of medication adherence was 35.89%. Medication adherence was associated with improved physical function and rehospitalization events. Providing education to patients and families about acute coronary syndrome and its treatment can lead to better therapeutic outcomes, improve patients' quality of life, and reduce rehospitalization.

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Conceptualization, Y., W.P.N., H.S., D.M.N.R.; Methodology, Y., W.P.N., H.S., D.M.N.R.; Software, Y., W.P.N., H.S., D.M.N.R.; Validation, Y., W.P.N., H.S., D.M.N.R.; Formal Analysis, Y., W.P.N., H.S., D.M.N.R.; Investigation, Y., W.P.N.; Resources, Y., W.P.N.; Data Curation, Y., W.P.N., H.S., D.M.N.R.; Writing - Original Draft, Y., W.P.N., F.M.B.; Writing - Review & Editing, Y., W.P.N., F.M.B.; Visualization, Y., W.P.N., F.M.B.; Supervision, W.P.N., H.S.; Project Administration, Y., W.P.N., H.S.; Funding Acquisition, W.P.N.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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