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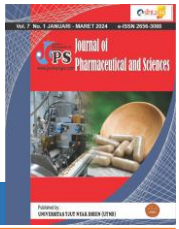

Guideline-Directed Medical Therapy Completeness and Its Impact on Therapeutic Outcomes in Unstable Angina Pectoris: A Tertiary Hospital Study in Indonesia

Kelengkapan Terapi Medis Sesuai Pedoman dan Dampaknya terhadap Luaran Terapi pada Pasien Angina Pektoris Tidak Stabil: Penelitian di Rumah Sakit Rujukan Tersier di Indonesia

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Abstract

Unstable angina pectoris (UAP) is a major cause of cardiovascular hospitalization and requires complex inpatient pharmacological management. Variability in the completeness of core guideline-recommended acute pharmacotherapy may influence inpatient therapeutic outcomes, including length of hospital stay (LOS). This study aimed to evaluate the completeness of core guideline-recommended pharmacotherapy and its association with LOS among hospitalized patients with unstable angina pectoris at a tertiary referral hospital in Indonesia. A descriptive observational study with a retrospective design was conducted using secondary data from medical records. Of 214 hospitalized patients screened, 144 adult patients diagnosed with unstable angina pectoris met the inclusion criteria. Data collected included demographic characteristics, smoking status, comorbidities, LOS, and pharmacological therapy administered during hospitalization. Pharmacotherapy completeness was operationally defined based on the documented use of three core disease-modifying drug classes recommended for the acute management of unstable angina pectoris: antiplatelet therapy (single or dual), statin therapy, and beta-blocker therapy based on core acute-phase recommendations in the ESC 2023 and AHA/ACC 2023 guidelines, at any time during the inpatient stay. Descriptive statistics were used to summarize patient characteristics and medication use, while bivariate analysis was performed to assess the association between pharmacotherapy completeness and LOS. Most patients were male (62.5%) and aged 40–59 years (47.9%) or ≥60 years (43.1%), with a median LOS of 4 days (interquartile range 3–5). The most frequently prescribed drug classes were statins (92.4%), beta-blockers (91.7%), aspirin (88.2%), and angiotensin-converting enzyme inhibitors or angiotensin receptor blockers (86.1%). Dual antiplatelet therapy was administered in 66.7% of patients, and anticoagulants in 28.5%. Bivariate analysis showed no statistically significant association between pharmacotherapy completeness and length of hospital stay ($p = 0.642$). In conclusion, hospitalized patients with unstable angina pectoris generally received pharmacological therapy aligned with core guideline-recommended acute-phase management. However, the absence of a significant association between pharmacotherapy completeness and LOS suggests that LOS is a multifactorial outcome influenced by clinical and organizational factors beyond pharmacological management. These findings highlight the importance of comprehensive inpatient care and structured medication review, including the role of clinical pharmacists, in optimizing treatment for patients with UAP.

***Keywords*: unstable angina pectoris; guideline-directed medical therapy; pharmacotherapy completeness; length of hospital stay; clinical pharmacy.**

Abstrak

Angina pektoris tidak stabil (unstable angina pectoris/UAP) merupakan salah satu penyebab utama rawat inap kardiovaskular dan memerlukan penatalaksanaan farmakologis rawat inap yang kompleks. Variasi dalam kelengkapan farmakoterapi inti fase akut berbasis pedoman dapat memengaruhi luaran terapi rawat

inap, termasuk lama rawat inap (length of stay/LOS). Penelitian ini bertujuan untuk mengevaluasi kelengkapan farmakoterapi inti berbasis pedoman serta hubungannya dengan LOS pada pasien UAP yang dirawat inap di rumah sakit rujukan tersier di Indonesia. Penelitian observasional deskriptif dengan desain retrospektif dilakukan menggunakan data sekunder dari rekam medis. Dari 214 pasien rawat inap yang disaring, sebanyak 144 pasien dewasa dengan diagnosis UAP memenuhi kriteria inklusi. Data yang dikumpulkan meliputi karakteristik demografis, status merokok, komorbiditas, LOS, serta terapi farmakologis yang diberikan selama perawatan. Kelengkapan farmakoterapi didefinisikan secara operasional berdasarkan dokumentasi penggunaan tiga kelas obat inti yang memodifikasi penyakit dan direkomendasikan untuk tata laksana fase akut UAP, yaitu terapi antiplatelet (tunggal atau ganda), terapi statin, dan terapi beta-blocker, berdasarkan rekomendasi inti fase akut dalam pedoman ESC 2023 dan AHA/ACC 2023, yang diberikan pada waktu tertentu selama perawatan inap. Analisis deskriptif digunakan untuk merangkum karakteristik pasien dan penggunaan obat, sedangkan analisis bivariat dilakukan untuk menilai hubungan antara kelengkapan farmakoterapi dan LOS. Sebagian besar pasien berjenis kelamin laki-laki (62,5%) dan berada pada kelompok usia 40–59 tahun (47,9%) atau ≥60 tahun (43,1%), dengan median LOS selama 4 hari (rentang interkuartil 3–5). Kelas obat yang paling sering diresepkan adalah statin (92,4%), beta-blocker (91,7%), aspirin (88,2%), serta ACE inhibitor atau ARB (86,1%). Terapi antiplatelet ganda diberikan pada 66,7% pasien, sedangkan antikoagulan digunakan pada 28,5% pasien. Analisis bivariat menunjukkan tidak terdapat hubungan yang bermakna secara statistik antara kelengkapan farmakoterapi dan lama rawat inap (p = 0,642). Sebagai kesimpulan, pasien UAP yang dirawat inap umumnya menerima terapi farmakologis yang selaras dengan rekomendasi inti tata laksana fase akut berbasis pedoman. Namun, tidak ditemukannya hubungan yang bermakna antara kelengkapan farmakoterapi dan LOS menunjukkan bahwa LOS merupakan luaran yang bersifat multifaktorial dan dipengaruhi oleh faktor klinis serta organisasi pelayanan kesehatan di luar manajemen farmakologis semata. Temuan ini menegaskan pentingnya pendekatan perawatan rawat inap yang komprehensif serta telaah obat yang terstruktur, termasuk peran farmasis klinik, dalam mengoptimalkan terapi pada pasien UAP.

Kata Kunci: angina pektoris tidak stabil; terapi medis berbasis pedoman; kelengkapan farmakoterapi; lama rawat inap; farmasi klinik.

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Introduction

Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality worldwide and continues to impose a substantial burden on global health systems. According to the World Health Organization (WHO), cardiovascular diseases account for approximately 19.8 million deaths annually, representing nearly one-third of all global deaths, with ischemic heart disease and stroke as the primary contributors. [1]. Beyond mortality, CVD contributes significantly to long-term disability, reduced quality of life, and escalating healthcare costs, underscoring its profound and persistent impact on population health worldwide [2][3].

In Indonesia, the burden of cardiovascular disease parallels global trends and presents major challenges to the national healthcare system. Epidemiological data indicate a high prevalence of cardiovascular risk factors, including hypertension, diabetes mellitus, dyslipidemia, obesity, and sedentary lifestyles. The 2018

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National Basic Health Research (Riskesdas) reported a stroke prevalence of 10.9 per 1,000 population, reflecting a substantial burden of atherosclerotic cardiovascular disease at the population level [4]. Consequently, cardiovascular conditions remain among the leading causes of hospitalization and healthcare expenditure, particularly in tertiary referral hospitals that manage patients with acute and complex presentations.

Unstable angina pectoris (UAP) represents a critical manifestation within the spectrum of acute coronary syndromes and is a common cause of cardiovascular hospitalization. Patients with UAP frequently present with acute ischemic symptoms, multiple cardiovascular risk factors, and comorbid conditions that necessitate intensive monitoring and comprehensive pharmacological management during hospitalization. Pharmacological therapy constitutes the cornerstone of UAP management, aiming to alleviate ischemic symptoms, prevent myocardial infarction, and reduce short- and long-term cardiovascular risk [5,6].

Current evidence-based clinical guidelines emphasize the use of multiple drug classes in the management of UAP and non–ST-elevation acute coronary syndromes. The 2023 European Society of Cardiology (ESC) guidelines highlight antithrombotic therapy, including antiplatelet and anticoagulant agents, as a central component of inpatient management, alongside beta-blockers, statins, and renin angiotensin system inhibitors when clinically appropriate [6]. Similarly, the 2023 American Heart Association/American College of Cardiology (AHA/ACC) guideline for chronic coronary disease reinforces the importance of foundational pharmacotherapy, including antiplatelet agents, statins, and angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, in reducing recurrent ischemic events and improving prognosis [5]. These therapies represent core disease-modifying treatments in the acute and early management phases of ACS.

In routine inpatient practice, patients with UAP often receive complex pharmacological regimens comprising antiplatelets, anticoagulants, beta-blockers, ACE inhibitors or angiotensin receptor blockers, statins, nitrates, and various supportive medications such as diuretics, gastroprotective agents, antidiabetic drugs, and symptomatic treatments. This multimodal therapeutic approach reflects the complexity of UAP management and often leads to polypharmacy. Polypharmacy has been identified by the WHO as a major patient safety concern, given its strong association with medication errors, adverse drug reactions, drug–drug interactions, and preventable patient harm, particularly in hospitalized patients with acute cardiovascular conditions [7–9]. Medication-related problems are particularly relevant in ACS populations due to advanced age, comorbidities, and the frequent need for combination antithrombotic therapy [8,9].

In the inpatient setting, treatment success is often assessed using pragmatic surrogate indicators, one of which is length of hospital stay (LOS). LOS reflects overall clinical stabilization, response to therapy, disease severity, comorbidity burden, and the need for diagnostic or interventional procedures during hospitalization. LOS is also routinely recorded in hospital administrative systems and widely used in health services research as an indicator of resource utilization and care efficiency [10] However, LOS does not represent a direct clinical endpoint and is influenced by multiple non-pharmacological factors, including discharge practices and institutional policies. Therefore, LOS should be interpreted as a healthcare process–related outcome rather than a direct measure of therapeutic effectiveness [11]. Despite these limitations, evaluating LOS in relation to pharmacotherapy patterns provides insight into real-world inpatient care processes, particularly in settings where hard clinical endpoints are not routinely available in retrospective datasets.

Within this context, clinical pharmacy services play a crucial role in supporting safe, effective, and rational medication use. Clinical pharmacists contribute to the evaluation of drug selection, dosing appropriateness, potential drug interactions, and therapeutic monitoring, especially in patients receiving complex multidrug regimens. Structured assessment of inpatient pharmacotherapy patterns offers an essential foundation for identifying areas where clinical pharmacy interventions may optimize medication use and improve medication safety[12,13].

Despite the high burden of unstable angina pectoris and its associated therapeutic complexity, comprehensive data describing pharmacological therapy profiles and the completeness of core guideline-recommended pharmacotherapy among hospitalized UAP patients in tertiary referral hospitals in Indonesia remain scarce. Most existing studies have focused on clinical outcomes or specific therapeutic interventions, rather than providing a holistic overview of medication use patterns in routine inpatient care. Therefore, this study aimed to describe the pharmacological therapy profile among hospitalized patients with unstable angina pectoris at RSUD Dr. Moewardi and to analyze the association between the completeness of core guideline-recommended acute pharmacotherapy and length of hospital stay as a surrogate indicator of inpatient therapeutic processes. In addition, this study provides a pharmacotherapy-focused perspective to

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support structured medication review and future development of clinical pharmacy services in the inpatient management of ACS.

Research Methodology

Materials

The materials used in this study consisted of secondary data obtained from patients' medical records. The data included demographic characteristics (age and sex), smoking status, length of hospital stay (LOS), comorbidities, and detailed pharmacological therapy administered during hospitalization. Pharmacotherapy data included drug names, dosage strengths, routes of administration, and frequency of use. All data were sourced from inpatient medical records of patients diagnosed with unstable angina pectoris at RSUD Dr. Moewardi, Central Java, Indonesia.

Study Design

This study employed a descriptive observational design with a retrospective approach. The primary focus of the study was to describe real-world inpatient pharmacological therapy patterns and evaluate the presence of core guideline-recommended pharmacotherapy classes. An analytic component was included solely to explore the association between pharmacotherapy completeness and length of hospital stay (LOS) as a healthcare process–related surrogate indicator.

This study was not intended to establish causal relationships, assess individualized clinical appropriateness, or evaluate dose optimization or drug–drug interactions. Rather, it aimed to evaluate prescribing patterns at the therapeutic class level and explore their association with LOS as a healthcare process-related outcome among hospitalized patients with unstable angina pectoris.

Sampling Technique

During the study period, 214 hospitalized patients with a cardiovascular diagnosis were identified in medical records. A total sampling technique was applied to include all patients who met the predefined eligibility criteria. After applying inclusion and exclusion criteria, 144 adult patients diagnosed with unstable angina pectoris were included in the final analysis. Each eligible hospitalization episode was considered a single study unit.

Inclusion criteria: hospitalized adult patients (≥18 years) diagnosed with unstable angina pectoris who received pharmacological therapy during hospitalization and had complete medical records.

Exclusion criteria: incomplete medication data, missing key demographic or clinical information, unclear cardiovascular diagnosis, or hospitalizations not primarily related to unstable angina pectoris. Patients with documented absolute contraindications or severe intolerance to core pharmacotherapy classes were not specifically analyzed separately, which may influence the interpretation of pharmacotherapy completeness and represents a potential source of residual classification bias.

Data Collection

Data were collected retrospectively using a structured data extraction form. Variables included patient age, sex, smoking status, LOS, comorbidities, and pharmacological therapy administered during hospitalization. All medications prescribed during the inpatient stay were recorded and verified for completeness.

Although dosage data were available, detailed assessment of dose appropriateness and potential drug–drug interactions was beyond the predefined scope of this study, which was designed as a drug utilization pattern study focusing on therapeutic class presence rather than individualized clinical evaluation or guideline adherence assessment.

Operational Definitions

Pharmacotherapy completeness was defined as documented use, at any time during hospitalization, of three core universally recommended disease-modifying drug classes recommended for the acute management of unstable angina pectoris: antiplatelet therapy (single or dual), statin therapy, and beta-blocker therapy, based on core acute-phase recommendations in the 2023 ESC ACS guideline and supported by AHA/ACC recommendations.

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Completeness was classified as complete if all three classes were prescribed and incomplete if any class was not documented. This definition reflects the presence of foundational acute-phase pharmacotherapy rather than full guideline-directed medical therapy (GDMT), as other agents (ACEi/ARB, anticoagulants, nitrates, etc.) are prescribed based on specific clinical indications.

LOS was defined as the number of days from admission to discharge and dichotomized into <4 and ≥4 days based on the study population's median LOS.

Data Analysis

Data analysis was performed using descriptive and bivariate statistical methods. Categorical variables were summarized as frequencies and percentages, while continuous variables were described using means and standard deviations or medians and interquartile ranges.

Pharmacological therapies were grouped into therapeutic classes. Analysis focused on the presence of therapeutic classes rather than evaluation of dosing intensity or interaction severity.

The association between pharmacotherapy completeness and LOS was assessed using the Pearson chi-square test or Fisher's exact test, as appropriate. A p-value of <0.05 was considered statistically significant. Analyses were performed using SPSS software.

Ethical Considerations

This study received approval from the Health Research Ethics Committee of RSUD Dr. Moewardi. The study constituted a secondary analysis of anonymized data derived from a previously approved master's thesis project, with no direct patient contact and no collection of new data.

Results and Discussion

Patient Characteristics

A total of 144 hospitalized patients diagnosed with unstable angina pectoris were included in this study. The demographic and clinical characteristics of the patients are presented in Table 1. The majority of patients were male (62.5%), while 37.5% were female.

Table 1. Demographic and Clinical Characteristics of Patients (n = 144)

Characteristics	n	(%)
Sex		
Male	90	62.5
Female	54	37.5
Age group (years)		
18–39	13	9.0
40–59	69	47.9
≥60	62	43.1
Smoking status		
Smoker	69	47.9
Non-smoker	75	52.1
Length of stay (LOS)		
<4 days	63	43.8
≥4 days	81	56.2

Data are presented as the number of patients (n) and the percentage (%).

Based on age group distribution, most patients were aged 40–59 years (47.9%), followed by those aged ≥60 years (43.1%). Patients aged 18–39 years accounted for 9.0% of the study population. Regarding smoking status, 52.1% of patients were non-smokers, while 47.9% had a history of smoking. Regarding length of hospital stay (LOS), 63 patients (43.8%) were hospitalized for less than 4 days, while 81 patients (56.2%) had a LOS of 4 days or longer.

The more detailed characteristics of the study population are summarized in Table 2. The mean age of patients was 57.1 ± 12.1 years, with a median age of 58 years (interquartile range [IQR] 50–65).

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Table 2. Numerical Characteristics of Patients

Variable	Mean ± SD	Median (IQR)
Age (years)	57.1 ± 12.1	58 (50–65)
Length of stay (days)	4.23 ± 1.56	4 (3–5)

The mean length of hospital stay was 4.23 ± 1.56 days, with a median LOS of 4 days (IQR 3–5).

Baseline Characteristics Based on the Pharmacotherapy Completeness

The baseline characteristics of patients receiving complete and incomplete pharmacotherapy are presented in **Table 3**. The distribution of sex, age group, smoking status, and comorbidity burden (CCI category) was generally comparable between groups. A slightly higher proportion of patients in the incomplete pharmacotherapy group experienced prolonged hospitalization (LOS ≥4 days), although LOS was not considered a baseline determinant.

Table 3. Baseline Characteristics According to Pharmacotherapy Completeness

Characteristic	Complete (n = 114)	Incomplete (n = 30)
Sex, n (%)		
Male	69 (60.5)	20 (66.7)
Female	45 (39.5)	10 (33.3)
Age group, n (%)		
18–39 years	9 (7.9)	4 (13.3)
40–59 years	56 (49.1)	15 (50.0)
≥60 years	49 (43.0)	11 (36.7)
Smoking status, n (%)		
Smoker	54 (47.4)	14 (46.7)
Non-smoker	60 (52.6)	16 (53.3)
CCI category, n (%)		
CCI <3	93 (81.6)	24 (80.0)
CCI ≥3	21 (18.4)	6 (20.0)
Length of stay, n (%)		
<4 days	51 (44.7)	11 (36.7)
≥4 days	63 (55.3)	19 (63.3)

Values are presented as the number of patients (n) and the percentage (%). Percentages are calculated within each pharmacotherapy completeness group. CCI: Charlson Comorbidity Index; LOS: length of hospital stay.

Pharmacotherapy Profile

Table 4. Pharmacotherapy Profile of Hospitalized Patients

Drug class	n	(%)
Aspirin (AP)	127	88.2
Dual antiplatelet therapy (DAPT)	96	66.7
Anticoagulants	41	28.5
Beta-blockers	132	91.7
ACE inhibitors / ARBs	124	86.1
Statins	133	92.4
Nitrates	79	54.9
PPI / H2RA	88	61.1
Antiarrhythmic agents	9	6.2
Antidiabetic agents	41	28.5

Note: Patients may receive more than one class of medication.

The pharmacotherapy profile of hospitalized patients with unstable angina pectoris is presented in Table 4. Statins were the most frequently prescribed drug class (92.4%), followed by beta-blockers (91.7%), aspirin (88.2%), and angiotensin-converting enzyme inhibitors or angiotensin receptor blockers (ACE inhibitors/ARBs) (86.1%). Dual antiplatelet therapy (DAPT) was administered to 66.7% of patients, while anticoagulants were prescribed in 28.5%. In addition, nitrates were used in 54.9% of patients, and gastroprotective agents (proton pump inhibitors or H2-receptor antagonists) were prescribed in 61.1%.

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Antiarrhythmic drugs were used in a small proportion of patients (6.2%), whereas antidiabetic agents were prescribed in 28.5% of patients. It should be noted that patients could receive more than one class of medication during hospitalization.

Association Between Pharmacotherapy Completeness and Length of Hospital Stay

The association between pharmacotherapy completeness and length of hospital stay is presented in **Table 5**. The odds of prolonged hospitalization (LOS ≥4 days) among patients receiving complete pharmacotherapy compared with incomplete pharmacotherapy were 1.40 (95% CI 0.61–3.20). However, this association was not statistically significant ($\chi^2 = 0.631$; $p = 0.427$).

Table 5. Association Between Pharmacotherapy Completeness and Length of Hospital Stay (Cut-off 4 days)

Pharmacotherapy completeness	LOS <4 days n (%)	LOS ≥4 days n (%)	OR (95% CI)	p-value
Incomplete	11 (36.7)	19 (63.3)	1.40 (0.61–3.20)	0.427
Complete	51 (44.7)	63 (55.3)		

Chi-square test.

Discussion

This study provides a comprehensive description of demographic characteristics and pharmacotherapy patterns among hospitalized patients with unstable angina pectoris (UAP), reflecting real-world inpatient clinical practice. The predominance of male patients and the high proportion of individuals aged ≥40 years are consistent with global epidemiological data showing that the incidence and hospitalization rates of acute coronary syndromes increase with advancing age and are generally higher among men, particularly in middle-aged and older populations. [14].

The median hospital stay of 4 days observed in this study is consistent with findings from previous hospital-based studies of patients with acute coronary syndromes, where median LOS is typically around 4 days, particularly in contemporary cohorts managed without prolonged inpatient trajectories or major complications. [10][15]. Length of stay is frequently used as an indirect indicator of disease complexity and comorbidity burden. Prolonged hospitalization has been associated with increased medication exposure, greater therapeutic complexity, and a higher risk of medication-related adverse events, especially in older patients. [16–18].

The pharmacotherapy profile observed in this study demonstrated high utilization of statins and beta-blockers, followed by aspirin and angiotensin-converting enzyme inhibitors or angiotensin receptor blockers in clinically appropriate patient subgroups. This prescribing pattern is broadly consistent with guideline-directed medical therapy as outlined in the 2023 European Society of Cardiology (ESC) guidelines for the management of acute coronary syndromes without persistent ST-segment elevation, which emphasize antiplatelet therapy, statin therapy, and beta-blocker therapy as core components of acute-phase management in patients with unstable angina pectoris [6].

Recommendations from the 2023 American Heart Association/American College of Cardiology (AHA/ACC) guideline further support the use of these foundational pharmacological therapies to reduce recurrent ischemic events and improve long-term prognosis [5]. Similar prescribing patterns have been reported in observational studies of hospitalized patients with coronary artery disease across diverse healthcare settings [19–23].

The relatively low utilization of antiarrhythmic agents suggests that clinically significant arrhythmias were not a predominant feature in this patient population, consistent with guideline-based recommendations that restrict the use of these agents to selected clinical indications due to their narrow therapeutic index and potential adverse effects [32]. In contrast, nearly one-third of patients received antidiabetic agents, reflecting the high prevalence of diabetes mellitus among patients with unstable angina and the added complexity of pharmacotherapy management in this comorbid population [33,34].

Approximately two-thirds of patients received dual antiplatelet therapy, while less than one-third were prescribed anticoagulants, highlighting the heterogeneity of antithrombotic strategies in real-world UAP management. According to the ESC and AHA/ACC guidelines, antithrombotic treatment decisions should be individualized based on ischemic risk, bleeding risk, renal function, and comorbidity burden. As a result, variability in antithrombotic use and consequently in pharmacotherapy completeness can be expected in routine inpatient practice, particularly in non-ST-elevation acute coronary syndrome populations [24–26].

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However, it also illustrates the inherent limitation of defining "pharmacotherapy completeness" at the drug-class level. The operational definition used in this study did not incorporate dosing intensity, timing of initiation, treatment continuity, or documented contraindications. Consequently, the completeness metric may not have been sufficiently sensitive to capture pharmacological optimization that could influence short-term inpatient outcomes such as LOS. Similar methodological concerns have been raised in drug-utilization studies, where class-level indicators did not correlate with short-term outcomes [27]. Similar hospital-based studies assessing medication use and short-term outcomes have frequently relied on class-level therapy indicators and simple bivariate analyses, which may likewise limit the ability to detect associations between pharmacotherapy patterns and length of hospital stay.

The observed pharmacotherapy profile reflects real-world inpatient management priorities. High utilization of gastroprotective agents (>60%) may represent a precautionary strategy to mitigate the risk of gastrointestinal bleeding in patients receiving dual antiplatelet therapy. However, it also raises the possibility of routine rather than risk-stratified PPI use, suggesting the need for pharmacist-led evaluation of deprescribing strategies before discharge.

Similarly, the frequent use of nitrates (>50%) suggests that symptomatic control of angina remains a central component of inpatient management. This may indicate persistent ischemic symptoms or variability in access to early revascularization, highlighting potential opportunities to optimize anti-ischemic therapy beyond symptom relief. Together, these findings illustrate that real-world pharmacotherapy patterns are influenced by symptom burden, perceived bleeding risk, and contextual inpatient care factors beyond strict adherence to guideline algorithms.

With respect to the association between pharmacotherapy completeness and length of hospital stay, this study did not demonstrate a statistically significant relationship between receipt of complete guideline-directed pharmacotherapy, defined according to ESC 2023 core recommendations, and LOS. This finding suggests that LOS in hospitalized patients with unstable angina pectoris represents a multifactorial outcome that is not solely determined by pharmacotherapy completeness. Length of stay is influenced by baseline disease severity, comorbidity burden, clinical stability, the need for diagnostic or interventional procedures, and institutional discharge practices [11].

Several previous studies have reported similar findings, showing that adherence to guideline-recommended cardiovascular pharmacotherapy does not consistently translate into shorter hospitalizations, particularly in heterogeneous inpatient populations. In patients with unstable angina and related acute coronary syndromes, LOS is often driven by non-pharmacological factors such as heart failure severity, renal dysfunction, diabetes mellitus, procedural timing, and post-procedural monitoring requirements, which may prolong hospitalization regardless of pharmacotherapy completeness [35–37].

Importantly, both ESC and AHA/ACC guidelines emphasize that the primary objectives of guideline-directed pharmacotherapy in unstable angina are the prevention of myocardial infarction, reduction of recurrent ischemic events, and improvement of long-term cardiovascular prognosis, rather than shortening hospital length of stay [5,6]. Therefore, the absence of a significant association between pharmacotherapy completeness and LOS in this study should not be interpreted as a lack of clinical benefit of comprehensive pharmacological management.

Instead, these findings highlight the limitations of using hospital length of stay as a sole surrogate indicator of therapeutic success and underscore the importance of interpreting LOS within a broader clinical and health-system context. Evidence from studies in acute coronary syndrome populations indicates that LOS is predominantly determined by disease severity, comorbid conditions, organ dysfunction, and the need for intensive monitoring or procedural care, rather than by pharmacotherapy completeness alone [37]. Consistent with this observation, the World Health Organization emphasizes that quality of pharmacotherapy should be assessed using multidimensional outcome measures—including medication appropriateness, safety indicators, monitoring quality, and longer-term clinical outcomes—rather than relying exclusively on administrative proxies such as LOS, which may inadequately capture patient safety and therapeutic effectiveness [7].

From a clinical perspective, these findings reinforce the importance of structured and continuous medication review in hospitalized patients with unstable angina pectoris, who are frequently exposed to multiple drug classes and complex therapeutic regimens. Evidence from hospital-based studies indicates that systematic pharmacotherapy evaluation is essential to identify and resolve drug-related problems, particularly in older patients and those with prolonged hospital stays, who are at higher risk of adverse drug reactions and medication errors [38,39]. In this context, clinical pharmacists, as integral members of a

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multidisciplinary healthcare team, play a crucial role in reviewing medication regimens, providing evidence-based recommendations, and supporting medication safety throughout hospitalization, ultimately improving quality of care and patient safety outcomes [39,40].

Clinical pharmacists can contribute by ensuring early initiation of key therapies, dose optimization (e.g., high-intensity statins), monitoring for drug–drug interactions in polypharmacy, evaluating the appropriateness of PPI co-prescription with DAPT, and ensuring continuity of evidence-based therapy at discharge [13,41]. Structured interventions such as medication reconciliation, discharge counseling, and pharmacist-led medication review have demonstrated benefits in reducing drug-related problems and improving therapy continuity in cardiovascular patients [39,40]. Thus, the present findings provide a practical foundation for targeted clinical pharmacy interventions focused on therapy optimization, risk stratification, and discharge continuity rather than merely documenting drug-class presence.

This study has limitations—the retrospective design limits causal inference. Dose intensity, treatment timing, contraindications, and drug-related problems were not systematically assessed. LOS, as used here, is a healthcare process-related surrogate outcome with limited sensitivity to pharmacotherapy effects. Nevertheless, the study provides valuable real-world data on inpatient pharmacotherapy patterns and highlights areas where pharmacy-led optimization may enhance the quality of cardiovascular care in Indonesian tertiary hospitals.

Conclusions

This study demonstrates a high utilization of core guideline-recommended pharmacotherapy antiplatelet therapy, statins, and beta-blockers among hospitalized patients with unstable angina pectoris, reflecting good alignment with contemporary cardiovascular treatment standards in routine clinical practice. However, using a drug class-based definition of pharmacotherapy completeness and bivariate analysis, no significant association was observed between therapy completeness and length of hospital stay. This finding should be interpreted cautiously, as the definition of completeness did not include dose intensity, timing of initiation, treatment continuity, or documented contraindications. In addition, hospital length of stay is a healthcare process-related outcome influenced by multiple clinical and system-level factors. Future research employing prospective designs, more comprehensive therapy quality indicators, multivariable analyses controlling for confounding factors, and direct clinical outcomes is needed to evaluate better the true impact of guideline-directed pharmacotherapy and structured clinical pharmacy interventions on inpatient cardiovascular care.

Conflict of Interest

The authors declare that there are no financial or non-financial interests that could be perceived as influencing the conduct, analysis, or reporting of this study.

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