

# CURRENT PRACTICE OF CLOPIDOGREL USE IN THE TREATMENT OF ACUTE CORONARY SYNDROME AT MILITARY HOSPITAL 175

Nguyen Van Thuan<sup>1</sup>, Bui Dang Minh Tri<sup>2\*</sup>, Bui Tung Hiep<sup>2</sup>, Nguyen Viet Khanh<sup>2</sup>, Tran Van Dung<sup>2</sup>

<sup>1</sup>Military Hospital 175 - 786 Nguyen Kiem, Hanh Thong Ward, Ho Chi Minh City, Vietnam

<sup>2</sup>Pham Ngoc Thach University of Medicine - 2 Duong Quang Trung, Hoa Hung Ward, Ho Chi Minh City, Vietnam

Received: 15/12/2025

Revised: 25/12/2025; Accepted: 31/12/2025

## ABSTRACT

**Objective:** To analyze the current practice of Clopidogrel use in the treatment of acute coronary syndrome at Military Hospital 175.

**Subjects and methods:** A prospective cross-sectional descriptive study was conducted on 110 hospitalized patients diagnosed with acute coronary syndrome who received Clopidogrel therapy at the Department of Cardiology, Military Hospital 175, from January 2024 to November 2025.

**Results:** The study included 110 patients with acute coronary syndrome, predominantly male (77.3%), with a mean age of  $65.2 \pm 11.3$  years. Dual antiplatelet therapy was predominantly used (96.4%), of which the combination of Aspirin and Clopidogrel accounted for the highest proportion (88.2%). The most commonly used loading-dose regimen was Aspirin 300 mg combined with Clopidogrel 300 mg (83.0%). The mean platelet aggregation after 6 days of maintenance-dose Clopidogrel was  $42.0 \pm 14.4\%$ , with no significant difference between patients with ST-elevation myocardial infarction ( $42.6 \pm 14.8\%$ ) and those with non-ST-elevation acute coronary syndrome ( $41.1 \pm 13.9\%$ ) ( $p > 0.05$ ). The overall rate of Clopidogrel resistance was 29.1%, which was comparable between the two clinical subgroups ( $p > 0.05$ ).

**Conclusion:** Clopidogrel is widely used in the management of acute coronary syndrome at Military Hospital 175, primarily as part of dual antiplatelet therapy. The degree of platelet inhibition and the rate of Clopidogrel resistance did not differ significantly among clinical presentations of acute coronary syndrome.

**Keywords:** Acute coronary syndrome, acute myocardial infarction, antiplatelet therapy.

## 1. INTRODUCTION

The global burden of acute coronary syndrome (ACS) continues to increase and remains one of the leading causes of morbidity and mortality worldwide, particularly in low- and middle-income countries [1]. Dual antiplatelet therapy (DAPT) with aspirin and a P2Y<sub>12</sub> receptor inhibitor constitutes the cornerstone of ACS management. Among P2Y<sub>12</sub> inhibitors, clopidogrel has long been the most widely used agent due to its broad availability, low cost, and favorable safety profile [2]. Recent international guidelines increasingly recommend newer P2Y<sub>12</sub> inhibitors, such as ticagrelor or prasugrel, for many patients with ACS because of their superior anti-ischemic efficacy. Nevertheless, in real-world clinical practice, clopidogrel remains extensively prescribed, especially in resource-limited settings and in elderly patients who are at higher risk of bleeding [3].

At Military Hospital 175, clopidogrel is routinely used in

the treatment of patients with ACS. However, the current patterns of clopidogrel utilization, including indications, dosing regimens, duration of therapy, concomitant use with other antithrombotic agents, and the degree of adherence to updated evidence-based treatment guidelines have not yet been systematically evaluated. Therefore, this study was conducted to analyze the real-world use of clopidogrel in the management of acute coronary syndrome at Military Hospital 175.

## 2. SUBJECTS AND METHODS

### 2.1. Subjects

The study population consisted of hospitalized patients diagnosed with acute coronary syndrome who were treated with clopidogrel (Plavix) at the Department of Cardiology, Military Hospital 175, from January 2024 to November 2025.

\*Corresponding author

Email: drtribui1@gmail.com Phone: (+84) 914186944 DOI: 10.52163/yhc.v66i8.4116

#### - Inclusion criteria:

Patients with a confirmed diagnosis of acute coronary syndrome according to the 2025 American Heart Association (AHA) guidelines [1], including ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation acute coronary syndrome (NSTEMI), comprising unstable angina and non-ST-segment elevation myocardial infarction (NSTEMI). Eligible patients were those prescribed clopidogrel with both a loading dose and a daily maintenance dose and who provided informed consent to participate in the study.

#### - Exclusion criteria:

Patients with active bleeding or a history of major internal bleeding; severe renal impairment with serum creatinine  $\geq 500 \mu\text{mol/L}$ ; end-stage malignancy; coma; major surgery within 7 days prior to enrollment; platelet count  $\leq 100 \times 10^9/\text{L}$ ; or patients who discontinued clopidogrel or were non-adherent to the prescribed treatment regimen.

## 2.2. Study Design

This was a prospective, cross-sectional, descriptive, non-interventional study.

#### Sample size calculation

The sample size was calculated using the formula for descriptive studies:

$$n = Z_{1-\alpha/2}^2 \frac{p(1-p)}{d^2}$$

where  $Z_{1-\alpha/2}$  corresponds to a 95% confidence level ( $Z_{1-\alpha/2} = 1.96$ );  $p$  represents the proportion of clopidogrel use among patients with ACS; and  $d$  denotes the acceptable margin of error (desired precision). Based on the study by Pham Thuy Hang et al. (2022), the proportion of ACS patients treated with clopidogrel at Kien An Hospital (Hai Phong) was 85.4% ( $p = 0.854$ ) [4], with  $\alpha = 0.05$  and  $d = 0.07$ ,  $Z_{1-\alpha/2} = 1.96$ , the calculated

sample size was 98 patients. After accounting for a 10% contingency, the final sample size was rounded up to 108 patients.

#### - Sampling method:

Convenience sampling was applied. All patients diagnosed with ACS who met the inclusion and exclusion criteria during the study period were enrolled. In practice, a total of 110 patients were included in the analysis.

## 2.3. Study Period and Setting

Data collection was conducted from January 2024 to November 2025 at Military Hospital 175.

## 2.4. Study Methods

#### - Data collection:

Data were collected from patients' medical records using a standardized data collection form.

#### - Study variables:

General characteristics of the study population, including age, sex, body mass index (BMI), comorbidities, smoking status, and history of cardiovascular disease.

Antiplatelet therapy regimens, loading-dose strategies, platelet aggregation measurements, and the prevalence of clopidogrel resistance in patients with acute coronary syndrome.

#### - Statistical analysis:

Collected data were entered using Microsoft Excel 2016 and analyzed with SPSS version 26.0.

## 2.5. Ethical Considerations

The study protocol was approved by the Board of Directors of Military Hospital 175. All patients were fully informed about the study objectives and procedures and voluntarily agreed to participate. The study was conducted solely for the purpose of protecting and improving patient health and did not serve any other objectives.

## 3. RESULTS

Table 1. Baseline characteristics of the study population

Characteristics		STEMI (n = 64)	NSTEMI-ACS (n = 46)	Total (n = 110)	p
Age (years)		63.8 $\pm$ 11.5	67.2 $\pm$ 10.9	65.2 $\pm$ 11.3	0.08
Sex	Male	51 (79.7%)	34 (73.9%)	85 (77.3%)	0.46
	Female	13 (20.3%)	12 (26.1%)	25 (22.7%)	
	BMI (kg/m <sup>2</sup> )	22.4 $\pm$ 2.5	22.9 $\pm$ 2.7	22.6 $\pm$ 2.6	0.32
BMI classification	Underweight	5 (7.8%)	3 (6.5%)	8 (7.3%)	0.69
	Normal weight	31 (48.4%)	25 (54.3%)	56 (50.9%)	
	Overweight	16 (25.0%)	11 (23.9%)	27 (24.5%)	
	Obesity	12 (18.8%)	7 (15.3%)	19 (17.3%)	
Comorbidities	Hypertension	38 (59.4%)	31 (67.4%)	69 (62.7%)	0.39
	Diabetes mellitus	9 (14.1%)	11 (23.9%)	20 (18.2%)	0.18
	Dyslipidemia	42 (65.6%)	31 (67.4%)	73 (66.4%)	0.84
	Current smoking	22 (34.4%)	9 (19.6%)	31 (28.2%)	0.07

Characteristics		STEMI (n = 64)	NSTE-ACS (n = 46)	Total (n = 110)	p
History of cardiovascular disease	Stroke	2 (3.1%)	6 (13.0%)	8 (7.3%)	0.04
	Myocardial infarction	6 (9.4%)	5 (10.9%)	11 (10.0%)	0.79
	Coronary intervention (PCI)	4 (6.3%)	6 (13.0%)	10 (9.1%)	0.21
	Chronic ischemic heart disease	1 (1.6%)	13 (28.3%)	14 (12.7%)	< 0.001

The study population consisted predominantly of male patients (77.3%), with a comparable mean age between the STEMI and NSTE-ACS groups. Patients with NSTE-ACS exhibited a significantly higher prevalence of prior ischemic stroke and chronic ischemic heart disease compared with those with STEMI, whereas other cardiovascular risk factors were generally similar between the two groups.

Table 2. Antiplatelet regimens used

Antiplatelet therapy regimens	STEMI (n = 64)	NSTE-ACS (n = 46)	Total (n = 110)
Clopidogrel	2 (3.1%)	2 (4.4%)	4 (3.6%)
Aspirin + Clopidogrel	56 (87.5%)	41 (89.1%)	97 (88.2%)
Aspirin + Ticagrelor	6 (9.4%)	3 (6.5%)	9 (8.2%)

The results demonstrated that 96.4% of patients were treated with dual antiplatelet therapy. Clopidogrel was used in 91.8% of patients, either as monotherapy or in combination with aspirin. The proportion of ticagrelor use was higher in the STEMI group (9.4%) than in the NSTE-ACS group (6.5%).

Table 3. Loading-dose regimens of antiplatelet agents

Loading-dose antiplatelet regimens			
STEMI (n = 64)	NSTE-ACS (n = 46)	Total (n = 110)	p
Clopidogrel 300 mg monotherapy			
2 (3.1%)	2 (4.4%)	4 (3.6%)	0.892
Dual antiplatelet therapy			
62 (96.9%)	44 (95.6%)	106 (96.4%)	1.000
Aspirin 300 mg + Clopidogrel 300 mg			
50 (80.6%)	38 (86.4%)	88 (83.0%)	0.725
Aspirin 300 mg + Clopidogrel 600 mg			
6 (9.7%)	3 (6.8%)	9 (8.5%)	
Aspirin 300 mg + Ticagrelor 180 mg			
6 (9.7%)	3 (6.8%)	9 (8.5%)	0.618

Dual antiplatelet loading regimens were predominantly used, accounting for 96.4% of all patients, whereas clopidogrel monotherapy loading was infrequent. The

most commonly prescribed loading regimen was aspirin 300 mg combined with clopidogrel 300 mg. The distribution of loading-dose regimens was similar between the STEMI and NSTE-ACS groups, with no statistically significant differences observed.

Table 4. Platelet aggregation

Platelet aggregation			
STEMI (n = 64)	NSTE-ACS (n = 46)	Total (n = 110)	p
Mean $\pm$ SD (%)			
42.6 $\pm$ 14.8	41.1 $\pm$ 13.9	42.0 $\pm$ 14.4	0.79

After six days of maintenance clopidogrel therapy, the mean platelet aggregation was 42.6  $\pm$  14.8% in the STEMI group and 41.1  $\pm$  13.9% in the NSTE-ACS group, with an overall mean of 42.0  $\pm$  14.4%. No statistically significant difference in platelet aggregation was observed between the two groups (p = 0.79).

Table 5. Prevalence of clopidogrel resistance in patients with acute coronary syndrome

Clopidogrel resistance	STEMI (n = 64)	NSTE-ACS (n = 46)	Total (n = 110)	p
Present	18 (28.1%)	14 (30.4%)	32 (29.1%)	0.78
Absent	46 (71.9%)	32 (69.6%)	78 (70.9%)	

The overall prevalence of clopidogrel resistance was 29.1%. The rates of resistance were comparable between the STEMI (28.1%) and NSTE-ACS (30.4%) groups, with no statistically significant difference (p = 0.78).

#### 4. DISCUSSION

The mean age of patients in this study was 65.2  $\pm$  11.3 years, which is higher than that reported by Allami M. (2024) but lower than that reported in some other studies. In the study by Allami M., which included 185 patients with NSTE-ACS (30.8%) and 415 patients with STEMI (69.2%), the mean age was 56.2  $\pm$  10.5 years, with a male-to-female ratio of 2.5:1 [5]. In our cohort, cardiovascular disease was most prevalent and associated with the highest mortality among patients aged  $\geq$ 65 years. Male patients constituted the majority of the study population, reflecting the general patient profile at Military Hospital 175. Male sex is a well-established risk factor for acute coronary syndrome, and the higher prevalence of ACS

among men observed in our study is consistent with the findings of Allami M [5]. According to the study by Al-Assadi M.Y. et al. (2025), women exhibited a higher prevalence of traditional cardiovascular risk factors, including diabetes mellitus (31.9% vs. 20.8%,  $p < 0.001$ ) and hypertension (44.5% vs. 32.0%,  $p < 0.001$ ), but had a lower prevalence of atrial fibrillation (0.8% vs. 2.5%,  $p = 0.033$ ) and were less likely to engage in lifestyle-related ACS risk behaviors such as smoking (31% vs. 83%,  $p < 0.001$ ) [6].

In our study, 41.8% of patients with ACS were overweight or obese. Previous studies have demonstrated that overweight status is a major risk factor for coronary artery disease, comparable to smoking, physical inactivity, and dyslipidemia. Other cardiovascular risk factors, including hypertension (62.7%) and dyslipidemia (66.4%), were highly prevalent and similarly distributed between the STEMI and NSTEMI-ACS groups, consistent with the findings of Pham Thi Ngoc Nga et al. (2024) [7]. Notably, the NSTEMI-ACS group had significantly higher rates of prior ischemic stroke (13.0% vs. 3.1%) and chronic ischemic heart disease (28.3% vs. 1.6%) than the STEMI group. This finding reflects the fact that NSTEMI-ACS more commonly occurs in older patients with multiple comorbidities and pre-existing chronic cardiovascular disease, as reported in previous studies [7]. However, when considering the overall cohort, no significant differences were observed between the two groups with respect to diabetes, hypertension, or smoking status ( $p > 0.05$ ).

Regarding treatment patterns, the majority of patients (96.4%) received dual antiplatelet therapy with aspirin and clopidogrel. Clopidogrel was used in 91.8% of patients, either as monotherapy or as part of dual therapy. The use of ticagrelor was relatively low (8.2% overall), occurring more frequently in the STEMI group (9.4%) than in the NSTEMI-ACS group (6.5%), although this difference was not statistically significant due to the small sample size. These findings reflect real-world clinical practice in Vietnam, where clopidogrel remains the most commonly prescribed P2Y<sub>12</sub> inhibitor, despite guideline recommendations favoring ticagrelor or prasugrel, largely because of cost considerations and concerns regarding bleeding risk. A cohort study conducted in China similarly reported widespread clopidogrel use (>60%) in routine practice, despite guideline preferences for newer P2Y<sub>12</sub> inhibitors [8]. In the present study, the standard loading regimen of aspirin 300 mg combined with clopidogrel 300 mg was most frequently used (83%). Only a small proportion of patients (8.5%) received an intensified clopidogrel loading dose of 600 mg or ticagrelor 180 mg. The distribution of loading regimens did not differ significantly between the STEMI and NSTEMI-ACS groups ( $p > 0.05$ ), in accordance with the 2025 AHA/ESC guidelines for the management of acute coronary syndrome [1].

After six days of maintenance clopidogrel therapy, mean platelet aggregation values were similar between the STEMI and NSTEMI-ACS groups (approximately 42%), with no statistically significant difference ( $p = 0.79$ ). The

overall prevalence of clopidogrel resistance, defined as platelet aggregation  $\geq 50\%$ , was 29.1%, with comparable rates between the STEMI and NSTEMI-ACS groups. This prevalence was lower than that reported by Tran Song Giang et al. (2024), who observed a clopidogrel resistance rate of 34% in 50 ACS patients after percutaneous coronary intervention using the VerifyNow system [9], and substantially lower than that reported by Ta Anh Hoang et al. (2025), who documented a resistance rate of 43.9% in 171 Vietnamese ACS patients using light transmission aggregometry [10]. Thus, the resistance rate observed in our study falls within the moderate-to-high range, lower than that reported by Ta Anh Hoang et al. but higher than that reported by Tran Song Giang et al. These differences may be attributable to variations in patient characteristics, disease severity, and platelet function testing methodologies.

Mechanistically, clopidogrel resistance is a multifactorial phenomenon. Several studies have demonstrated that non-genetic factors, such as concomitant proton pump inhibitor use and impaired renal function, are associated with increased platelet reactivity and a higher risk of clopidogrel resistance. Ta Anh Hoang et al. identified proton pump inhibitor use and reduced glomerular filtration rate as independent risk factors for clopidogrel resistance in Vietnamese patients with ACS [10]. These mechanisms, including genetic polymorphisms, drug interactions, and patient-specific physiological factors, may explain the relatively high prevalence of clopidogrel resistance observed among Vietnamese and Asian ACS populations compared with Western cohorts.

#### Study limitations

This study has several limitations. The relatively small sample size and single-center design may limit the generalizability of the findings to the broader ACS population. The cross-sectional design without long-term follow-up precluded evaluation of the association between clopidogrel resistance and post-discharge cardiovascular outcomes. Platelet response to clopidogrel was assessed solely using platelet aggregation testing, without analysis of CYP2C19 genetic polymorphisms, thereby limiting the ability to fully elucidate the contribution of genetic factors. Additionally, the effects of concomitant medications and treatment adherence during follow-up were not rigorously controlled, which may have influenced the results.

#### 5. CONCLUSIONS

In this cohort of 110 patients with acute coronary syndrome, antiplatelet therapy in real-world clinical practice largely adhered to national treatment recommendations, with aspirin plus clopidogrel being the most commonly prescribed regimen across both clinical subtypes of ACS. The antiplatelet response to clopidogrel was generally comparable between patient groups; however, a substantial proportion of patients exhibited clopidogrel resistance. These findings provide practical evidence to support the monitoring of treatment efficacy



and the consideration of individualized antiplatelet therapy in patients with acute coronary syndrome.

## REFERENCES

- [1] Rao S.V, O'Donoghue M.L et al. ACC/AHA/ACEP/NAEMSP/SCAI Guideline for the management of patients with acute coronary syndromes: A report of the American College of Cardiology/American Heart Association Joint Committee on clinical practice guidelines. *Circulation*, 2025, 151 (13): e771-e862. doi: 10.1161/CIR.0000000000001309.
- [2] Beavers C.J, Patel P, Naqvi I.A. Clopidogrel. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, 2025. <https://pubmed.ncbi.nlm.nih.gov/29261873/>
- [3] Zocca P, Liefke C van der Heijden et al. Clopidogrel or Ticagrelor in acute coronary syndrome patients treated with newer-generation drug-eluting stents: CHANGE DAPT. *EuroIntervention*, 2017, 13 (10): 1168-1176. doi: 10.4244/EIJ-D-17-00634.
- [4] Pham Thuy Hang, Nguyen Thi Hanh, Luong Thanh Hoai Thu. Current use of antiplatelet therapy in the treatment of acute coronary syndrome at the Department of Cardiology, Kien An Hospital, Hai Phong, Vietnam, in 2017. *Vietnam Medical Journal*. 2022;515 (Special Issue, Part 1):105–112.
- [5] Allami M. A cross-sectional study on the epidemiology and risk factors of acute coronary syndrome in Northern Iraq. *Cureus*, 2024, 16 (6): e63291. doi: 10.7759/cureus.63291.
- [6] Al-Assadi M.Y, Aljaber N.N et al. Sex-related differences in acute coronary syndrome: insights from an observational study in a Yemeni cohort. *Front Cardiovasc Med*, 2025, 12: 1481917. doi: 10.3389/fcvm.2025.1481917.
- [7] Pham Thi Ngoc Nga et al. Comprehensive analysis of demographic, clinical, and genetic characteristics in acute myocardial infarction patients. *F1000Research*, 2024. DOI: 10.12688/f1000research.154230.1
- [8] He P, Luo X et al. Clinical outcome between Ticagrelor versus Clopidogrel in patients with acute coronary syndrome and diabetes. *Cardiovascular Therapeutics*, 2021: 5546260. doi: 10.1155/2021/5546260.
- [9] Tran Song Giang et al. Early detection of resistance to dual antiplatelet therapy in patients who have undergone percutaneous coronary intervention using the VerifyNow test and associated factors. *Medicine International*, 2024, 4 (6): 56. doi: 10.3892/mi.2024.180.
- [10] Ta Anh Hoang et al. Association of P2RY12 gene variants and non-genetic factors with Clopidogrel responsiveness in Vietnamese patients after percutaneous coronary intervention: A cross-sectional study. *J Clin Lab Anal*, 2025, 39 (5): e70003. doi: 10.1002/jcla.70003.