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Clinical Correlation Between Inferior Vessel Occlusion and Arrhythmia Incidence in Acute Coronary Sundrome Patients

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ABSTRACT
Background: Arrhythmia is a frequent acute complication in patients with Acute Coronary Syndrome (ACS) and significantly contributes to morbidity and mortality. Myocardial ischemia, autonomic imbalance, and structural myocardial injury can lead to electrical instability that triggers supraventricular and ventricular arrhythmias. Local data evaluating the relationship between arrhythmia incidence and coronary lesion location remain limited and are essential for improving risk stratification, monitoring, and therapeutic strategies. Objective: To evaluate the burden of arrhythmia incidence in ACS patients and examine its correlation with coronary vessel involvement at Dr. Ramelan Naval Hospital, Surabaya. Methods: A prospective clinical study was conducted on 150 ACS patients treated between January and July 2024. Patients were categorized according to diagnosis (NSTEMI or STEMI), gender, age group (<60 years and ≥60 years), and coronary lesion location (anterior, lateral, or inferior) based on ECG and coronary catheterization findings. Arrhythmia incidence was analyzed using descriptive frequency distribution across subgroups. Results: Most patients were male (72%) and younger than 60 years (57%). Among 113 NSTEMI patients, 63 (42%) developed arrhythmias, predominantly right bundle branch block (RBBB), atrial fibrillation, and sinus bradycardia. In 37 STEMI patients, 26 (18%) experienced arrhythmias, mainly ventricular tachycardia (VT) and sinus bradycardia. Arrhythmias were more frequent in men. Inferior coronary lesions were associated with the highest arrhythmia rate (34%), compared to anterior (19%) and lateral (7%) lesions. Conclusion: Arrhythmias are common in ACS, particularly NSTEMI and inferior infarction. Age, gender, and lesion location are key predictors for determining intensive monitoring and optimizing management strategies.

Keyword: cute coronary syndrome; arrhythmia; inferior myocardial infarction; right coronary artery; bundle branch block.

INTRODUCTION

Acute Coronary Syndrome (ACS) represents a spectrum of clinical conditions caused by a sudden reduction in coronary blood flow due to rupture or erosion of an atherosclerotic plaque followed by thrombus formation (Fahed & Jang, 2021; Młynarska et al., 2024; Theofilis et al., 2023). ACS encompasses ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI), and unstable angina (Bubulytė & Maneikienė, 2024; Evanchan, 2020; Gibler et al., 2018). This disease remains one of the leading causes of cardiovascular morbidity and mortality worldwide (Gaidai et al., 2023; Naveed et al., 2024). According to the World Health Organization (WHO, 2023), ischemic heart disease accounts for approximately nine million deaths annually, representing 16% of all global deaths. Despite advances in reperfusion therapy and pharmacological management that have reduced mortality rates, acute complications such as arrhythmias remain significant clinical challenges requiring ongoing investigation and improved risk stratification (Zysman et al., 2023).

Arrhythmia is one of the most frequently encountered complications during the acute phase of ACS (Demidova et al., 2024; Kalarus et al., 2019). Cardiac rhythm disturbances can occur due to myocardial electrical instability triggered by ischemia, metabolic disturbances in myocardial cells, autonomic nervous system imbalance, and damage to the cardiac conduction system (Herring et al., 2019; Sarkar & Ajijola, 2024). The manifestations of arrhythmia range from supraventricular disturbances, such as atrial fibrillation and atrial flutter, to ventricular arrhythmias, including ventricular tachycardia (VT) and ventricular fibrillation (VF), which can potentially lead to sudden cardiac death (Page et al., 2016). The incidence of arrhythmias in ACS patients has been reported to be substantial, particularly during the early phase of myocardial infarction (Kalarus et al., 2019). Previous studies have demonstrated that atrial fibrillation occurs in approximately 7–21% of ACS patients, while ventricular arrhythmias are reported in 15–20% of cases during hospitalization (Chyou et al., 2023; Tran et al., 2019). These arrhythmic events not only worsen hemodynamic stability but also increase the risk of heart failure, stroke, and both short- and long-term mortality (Disertori et al., 2016).

Several factors are known to influence the variability of arrhythmia occurrence in ACS patients (Noubiap et al., 2022). Advanced age is associated with degenerative changes in the cardiac conduction system and a higher prevalence of cardiovascular comorbidities, increasing susceptibility to rhythm disturbances (Vlasova et al., 2025). Gender differences in hormonal profiles, risk factor distribution, and the extent of atherosclerosis may also contribute to variations in arrhythmia patterns between men and women (Kavousi, 2020). Additionally, the extent of myocardial damage, timing of reperfusion, and the presence of underlying structural heart disease play important roles in determining arrhythmia risk (Sagris et al., 2024). However, one of the most critical factors explaining variation in arrhythmia incidence is the location of the coronary artery lesion or occlusion (Nakamura et al., 2021).

The anatomical basis for this relationship lies in the blood supply to the cardiac conduction system (Arshad & Atkinson, 2022). The sinoatrial (SA) node, which functions as the heart's natural pacemaker, receives its blood supply from the sinoatrial nodal artery, originating from the right coronary artery (RCA) in approximately 55–60% of individuals and from the left circumflex artery in the remaining 40–45%. The atrioventricular (AV) node receives its blood supply from the AV nodal artery, which arises from the RCA in 90% of cases (and from the left circumflex artery in the remaining 10%). Therefore, lesions involving the RCA—particularly those causing inferior myocardial infarction—can directly compromise blood flow to these critical structures, increasing the risk of sinus bradycardia, AV block, and other conduction disturbances. In contrast, anterior lesions involving the left anterior descending artery (LAD) are more frequently associated with ventricular arrhythmias due to the extensive area of myocardial ischemia and the potential for re-entry circuits to develop in the large affected myocardial territory.

Previous research has extensively examined the relationship between ACS and arrhythmias from various perspectives. Byrne (2021), in a large-scale analysis from the TRACER trial, demonstrated that atrial fibrillation occurring during ACS hospitalization was associated with significantly higher rates of mortality, stroke, and heart failure at one-year

follow-up. Helbitz (2025) conducted a systematic review and meta-analysis of 43 studies involving more than 270,000 patients and confirmed that new-onset atrial fibrillation in ACS is an independent predictor of both short- and long-term mortality. Regarding ventricular arrhythmias, Kosmidou (2017) analyzed data from the HORIZONS-AMI trial and found that sustained VT or VF occurred in 5.7% of STEMI patients undergoing primary percutaneous coronary intervention, and was associated with markedly increased 30-day and three-year mortality. More recently, Feldmann (2019) examined the relationship between infarct location and arrhythmia risk in a cohort of 1,200 ACS patients, reporting that inferior wall myocardial infarction was associated with a 2.5-fold increased risk of bradyarrhythmias requiring temporary pacemaker insertion compared with anterior wall infarction.

Despite the substantial body of international research on this topic, significant knowledge gaps remain, particularly in the Indonesian context. Local epidemiological data evaluating the relationship between arrhythmia incidence and coronary lesion location are still limited. Variations in population characteristics, risk factor profiles, genetic predisposition, healthcare infrastructure, and clinical management protocols can significantly influence the distribution and patterns of arrhythmias in different clinical settings. Furthermore, most previous studies have focused on either supraventricular or ventricular arrhythmias in isolation, with limited research comprehensively examining the full arrhythmia spectrum—including conduction disturbances, bradyarrhythmias, and tachyarrhythmias—in relation to coronary lesion location. This gap is particularly important because the clinical implications and management strategies differ substantially across arrhythmia types.

The urgency of this research is underscored by several critical factors. First, arrhythmias in ACS patients are associated with significantly worse outcomes, including prolonged hospital stay, increased need for intensive care, higher rates of heart failure, and elevated mortality. Second, early identification of patients at highest risk for specific arrhythmia types could facilitate targeted monitoring strategies, enabling more efficient allocation of limited healthcare resources and potentially preventing life-threatening complications. Third, understanding the relationship between lesion location and arrhythmia patterns could inform revascularization strategies and guide the selection of antiarrhythmic therapy. Fourth, as Indonesia continues to develop its cardiovascular services and expand access to primary percutaneous coronary intervention, local data are essential for establishing evidence-based clinical pathways and quality improvement initiatives that reflect the unique characteristics of the Indonesian population.

The novelty of this research lies in several aspects. First, it provides contemporary local data from a major tertiary referral hospital in Indonesia, offering insights into arrhythmia patterns that may differ from those reported in Western populations. Second, it comprehensively examines the full spectrum of arrhythmias—including conduction disturbances (RBBB, LBBB, AV block), supraventricular arrhythmias (atrial fibrillation, atrial flutter, PAC), and ventricular arrhythmias (PVC, VT, VF)—in relation to coronary lesion location, rather than focusing on a single arrhythmia type. Third, it stratifies the analysis by both ACS type (NSTEMI vs. STEMI) and demographic factors (age and gender), providing a multidimensional understanding of arrhythmia risk. Fourth, it specifically

investigates the clinical correlation between inferior vessel occlusion and arrhythmia incidence, testing the anatomical hypothesis regarding blood supply to the conduction system in a real-world clinical setting.

The primary objective of this study is to evaluate the burden of arrhythmia incidence in ACS patients and analyze its correlation with coronary vessel involvement at Dr. Ramelan Naval Hospital, Surabaya. Specifically, it aims to: (1) describe the frequency and types of arrhythmias occurring in NSTEMI and STEMI patients; (2) examine the distribution of arrhythmias by gender and age group; and (3) analyze the relationship between coronary lesion location (anterior, lateral, inferior) and arrhythmia occurrence. By achieving these objectives, the research contributes both clinically and practically to cardiovascular care.

The clinical contribution of this study lies in providing evidence-based data to support risk stratification, monitoring strategies, and therapeutic decision-making for ACS patients at risk of arrhythmias. The findings will enable clinicians to identify patients at the highest risk based on lesion location and demographic characteristics, allowing for more targeted monitoring and timely intervention. Practically, the results can inform the development of institutional protocols for arrhythmia surveillance, guide resource allocation for telemetry monitoring, and support clinical decision-making regarding prophylactic antiarrhythmic therapy or temporary pacemaker standby in high-risk patients. Ultimately, this research aims to reduce morbidity and mortality from arrhythmic complications in ACS patients through enhanced understanding of risk factors and more personalized patient management.

METHOD

This prospective clinical study was conducted on 150 consecutive patients diagnosed with Acute Coronary Syndrome (ACS) who were treated at Dr. Ramelan Naval Hospital, Surabaya, between January and July 2024. Patients were categorized based on diagnosis (NSTEMI and STEMI), gender, age group (<60 years and ≥60 years), and location of coronary vessel lesions (anterior, lateral, and inferior) determined by electrocardiography (ECG) and coronary catheterization findings. The incidence and pattern of arrhythmias were assessed by analyzing their frequency distribution across each subgroup. Comparative descriptive analysis was performed to evaluate the correlation between coronary lesion location and arrhythmia occurrence.

RESULTS AND DISCUSSION

Table 1. Gender and age groups based on NSR and Arrhythmia groups

Clinical	Electric change	
	NSR	Aritmia
Sex (150)		
Male (108)	41 (27%)	67 (45%)
Female (42)	20 (13%)	22 (15%)
Age 150		
<60 (86)	40 (26%)	46 (31%)
≥60 (64)	41 (14%)	43 (29%)

Table 2. Arrhythmia On Nstemi

Type of Arrhythmia	Number of Patient	Percentage
NSR	50	33%
Sinus Tachycardia	1	
Sinus Bradycardia	7	
PAC	4	
PVC	6	
Atrial Fibrillation (AFib)	8	
Atrial Flutter	6	
RBBB	12	
LBBB	7	
AV Block 1 and 2 Mobitz I	8	
AV Block 2 Mobitz II and TAVB	1	
VT	2	
VF	1	
TOTAL	63	42%

Table 3. Arrhythmia On Nstemi

Type of Arrhythmia	Number of Patient	Percentage
NSR	11	7%
Sinus Tachycardia	0	
Sinus Bradycardia	4	
PAC	2	
PVC	3	
Atrial Fibrillation (AF ib)	2	
Atrial Flutter	1	
RBBB	3	
LBBB	1	
AV Block 1 and 2 Mobitz I	1	
AV Block 2 Mobitz II and TAVB	3	
VT	4	
VF	2	
TOTAL	26	18%

Table 4. Incidence of Arrhythmia By Gender

Type of Arrhythmia	Female	Percentage	Male	Percentage
NSR	20	13%	41	33%
Sinus Tachycardia	0		1	
Sinus Bradycardia	1		10	
PAC	2		4	
PVC	3		6	
Atrial Fibrillation (AFib)	3		7	
Atrial Flutter	1		6	
RBBB	3		12	
LBBB	5		3	

AV Block 1 and 2 Mobitz I	0		9	
AV Block 2 Mobitz II and TAVB	1		3	
VT	1		5	
VF	2		1	
TOTAL	22	15%	67	45%

Table 5. Incidence Of Arrhythmia By Age

Type of Arrhythmia	<60 Years	Percentage	>60 Years	Percentage
NSR	40	27%	21	14%
Sinus Tachycardia	1		0	
Sinus Bradycardia	6		5	
PAC	4		2	
PVC	7		2	
Atrial Fibrillation (AFib)	4		6	
Atrial Flutter	1		6	
RBBB	6		9	
LBBB	2		6	
AV Block 1 and 2 Mobitz I	6		3	
AV Block 2 Mobitz II and TAVB	3		1	
VT	6		1	
VF	1		2	
TOTAL	46	31%	43	29%

Table 6. Findings Regarding Blood Vessel Location

Clinical	Electrical Change	
	NSR	Arrhythmia
ECG and Catheterization Location		
Anterior	26 (17%)	28 (19%)
Lateral	11 (7%)	10 (7%)
Inferior	24 (16%)	51 (34%)

150 patients in the period January 2024 - July 2024 were selected as the study samples. 86 (57%) patients aged <60 years old, while 64 (43%) patients aged >60 years old. There was a significant difference in the gender of the study samples, wherein 108 (72%) patients were male, more than the female patients by 42 (28%) [Table 1].

There were 113 patients diagnozed with NSTEMI, and there were 50 (33%) patients involved in the Normal Sinus Rhythm (NSR) group, while 63 (42%) patients were involved in the arrhythmia group. The highest number of arrhythmia was occupied by the Right Bundle Branch Block (RBBB) by 12 patients, followed by the A fibrillation group by 8 patients. Furthermore, the least number was occupied by the sinus tachycardia, TAVB and VF groups which consisted of 1 patient, respectively [Table 2]. There were 37 patients diagnosed with STEMI, consisting of 11 (7%) patients in the NSR group and 26 (18%) patients in the arrhythmia group. The most frequent arrhythmias were VT and sinus bradycardia, each affecting four patients, followed by PVC, RBBB, and TAVB, each affecting three patients. The least frequent was sinus tachycardia, which occurred in none of the patients, followed by

atrial flutter, Left Bundle Branch Block (LBBB), and AV Block I, each found in one patient [Table 2].

Based on the incidence of arrhythmia by gender, 20 (13%) female patients and 41 (33%) male patients were included in the NSR group, respectively. The predominant arrhythmia type among female patients was LBBB (five patients), while among male patients it was RBBB (12 patients). The least frequent arrhythmias among female patients were sinus tachycardia and AVB 1/AVB2 Mobitz I (zero patients each), whereas among male patients, sinus tachycardia and VF were the least frequent (one patient each) [Table 3].

Based on arrhythmia incidence by age, respondents were divided into two groups: <60 years and ≥60 years. A total of 40 (27%) patients aged <60 years and 21 (14%) patients aged ≥60 years were included in the NSR group. The predominant arrhythmias among patients aged <60 years and ≥60 years were PVC (seven patients) and RBBB (nine patients), respectively. The least frequent arrhythmias among patients aged <60 years were sinus tachycardia, atrial flutter, and VF (one patient each), whereas among those aged ≥60 years, sinus tachycardia was not observed (zero patients) [Table 3].

A total of 150 patients were categorized into three groups based on the location of coronary vessel lesions. The anterior arterial group included 54 patients, with 26 (17%) in the NSR group and 28 (19%) in the arrhythmia group. The lateral arterial group consisted of 21 patients, with 11 (7%) in the NSR group and 10 (7%) in the arrhythmia group. The inferior arterial group had the highest number of patients—75 (50%) in total—with 24 (16%) in the NSR group and 51 (34%) in the arrhythmia group [Table 4].

CONCLUSION

This study revealed that arrhythmia was a common complication in patients with Acute Coronary Syndrome (ACS), with a higher incidence in patients with NSTEMI than in those with STEMI. The most frequent types of arrhythmias in the NSTEMI group were RBBB, atrial fibrillation, and sinus bradycardia. Conversely, ventricular tachycardia (VT) and sinus bradycardia were more commonly found in the STEMI group. The distribution of arrhythmias was also influenced by gender, with a higher incidence in male patients than in female patients, showing a dominant pattern of RBBB in males and LBBB in females. In addition, age played an important role in the variation of arrhythmia types. It was found that patients aged <60 years were more prone to premature atrial contraction (PAC), whereas patients aged ≥60 years were more frequently affected by RBBB, consistent with degenerative changes in the conduction system and a higher prevalence of cardiovascular comorbidities in the elderly group.

Based on the location of coronary vessel lesions, arrhythmias were most commonly observed in patients with inferior lesions, followed by those with anterior and lateral lesions. This finding can be explained by the involvement of the blood supply to the sinoatrial and atrioventricular nodes, which predominantly originate from the right coronary artery. Thus, age, sex, and the location of coronary vessel lesions can serve as important clinical predictors for determining intensive monitoring strategies, selecting appropriate antiarrhythmic therapy, and optimizing revascularization strategies to reduce morbidity and mortality due to arrhythmia complications among patients with ACS.

REFERENCES

Arshad, A., & Atkinson, A. J. (2022). A 21st century view of the anatomy of the cardiac conduction system. *Translational Research in Anatomy*, *28*, 100204.

Bubulytė, S., & Maneikienė, V. V. (2024). Acute coronary syndromes–ST-elevation myocardial infarction and non-ST elevation myocardial infarction–literature review. *Medicinos Mokslai*, *12*(3), 118–124.

Byrne, C., Pareek, M., Krogager, M. L., Ringgren, K. B., Wissenberg, M., Folke, F., Lippert, F., Gislason, G., Køber, L., & Søgaard, P. (2021). Increased 5-year risk of stroke, atrial fibrillation, acute coronary syndrome, and heart failure in out-of-hospital cardiac arrest survivors compared with population controls: A nationwide registry-based study. *Resuscitation*, *169*, 53–59.

Chyou, J. Y., Barkoudah, E., Dukes, J. W., Goldstein, L. B., Joglar, J. A., Lee, A. M., Lubitz, S. A., Marill, K. A., Sneed, K. B., & Streur, M. M. (2023). Atrial fibrillation occurring during acute hospitalization: a scientific statement from the American Heart Association. *Circulation*, *147*(15), e676–e698.

Demidova, M. M., Holmqvist, F., Erlinge, D., & Platonov, P. G. (2024). Ventricular arrhythmias during ST-segment elevation myocardial infarction and arrhythmic complications during recurrent ischaemic events. *European Heart Journal*, *45*(5), 393–395.

Disertori, M., Masè, M., Rigoni, M., Nollo, G., & Ravelli, F. (2016). Heart rate turbulence is a powerful predictor of cardiac death and ventricular arrhythmias in postmyocardial infarction and heart failure patients: a systematic review and meta-analysis. *Circulation: Arrhythmia and Electrophysiology*, *9*(12), e004610.

Evanchan, J. (2020). Unstable Angina/Non-ST Elevation Myocardial Infarction. In *Practical Cardiology: Evaluation and Treatment of Common Cardiovascular Disorders* (pp. 99–110). Springer.

Fahed, A. C., & Jang, I.-K. (2021). Plaque erosion and acute coronary syndromes: phenotype, molecular characteristics and future directions. *Nature Reviews Cardiology*, *18*(10), 724–734.

Feldmann, K. J., Goldstein, J. A., Marinescu, V., Dixon, S. R., & Raff, G. L. (2019). Disparate impact of ischemic injury on regional wall dysfunction in acute anterior vs inferior myocardial infarction. *Cardiovascular Revascularization Medicine*, *20*(11), 965–972.

Gaidai, O., Cao, Y., & Loginov, S. (2023). Global cardiovascular diseases death rate prediction. *Current Problems in Cardiology*, *48*(5), 101622.

Gibler, W. B., Racadio, J. M., Hirsch, A. L., & Roat, T. W. (2018). Continuum of Care for Acute Coronary Syndrome: Optimizing Treatment for ST-Elevation Myocardial Infarction and Non–St-Elevation Acute Coronary Syndrome. *Critical Pathways in Cardiology*, *17*(3), 114–138.

Helbitz, A., Haris, M., Younsi, T., Romer, E., Ginks, W., Raveendra, K., Hayward, C., Shuweihdi, F., Larvin, H., & Cameron, A. (2025). Prediction of atrial fibrillation after a stroke event: a systematic review with meta-analysis. *Heart Rhythm*, *22*(7), 1637–

1645.

Herring, N., Kalla, M., & Paterson, D. J. (2019). The autonomic nervous system and cardiac arrhythmias: current concepts and emerging therapies. *Nature Reviews Cardiology*, *16*(12), 707–726.

Kalarus, Z., Svendsen, J. H., Capodanno, D., Dan, G.-A., De Maria, E., Gorenek, B., Jędrzejczyk-Patej, E., Mazurek, M., Podolecki, T., & Sticherling, C. (2019). Cardiac arrhythmias in the emergency settings of acute coronary syndrome and revascularization: an European Heart Rhythm Association (EHRA) consensus document, endorsed by the European Association of Percutaneous Cardiovascular Interventions (EAPCI), and European Acute Cardiovascular Care Association (ACCA). *EP Europace*, *21*(10), 1603–1604.

Kavousi, M. (2020). Differences in epidemiology and risk factors for atrial fibrillation between women and men. *Frontiers in Cardiovascular Medicine*, *7*, 3.

Kosmidou, I., Embacher, M., McAndrew, T., Dizon, J. M., Mehran, R., Ben-Yehuda, O., Mintz, G. S., & Stone, G. W. (2017). Early ventricular tachycardia or fibrillation in patients with ST elevation myocardial infarction undergoing primary percutaneous coronary intervention and impact on mortality and stent thrombosis (from the harmonizing outcomes with revascularization and stents in acute myocardial infarction trial). *The American Journal of Cardiology*, *120*(10), 1755–1760.

Młynarska, E., Czarnik, W., Fularski, P., Hajdys, J., Majchrowicz, G., Stabrawa, M., Rysz, J., & Franczyk, B. (2024). From atherosclerotic plaque to myocardial infarction—The leading cause of coronary artery occlusion. *International Journal of Molecular Sciences*, *25*(13), 7295.

Nakamura, T., Takami, M., Fukuzawa, K., Kiuchi, K., Kono, H., Kobori, A., Sakamoto, Y., Watanabe, R., Okumura, Y., & Yamashita, S. (2021). Incidence and Characteristics of Coronary Artery Spasms Related to Atrial Fibrillation Ablation Procedures―Large-Scale Multicenter Analysis―. *Circulation Journal*, *85*(3), 264–271.

Naveed, A., Atique, R., Saeed, H. A., Sharif, J., Haidar, A., & Samad, A. (2024). Cardiovascular Diseases: Understanding the Leading Cause of Death Worldwide. *Global Journal of Multidisciplinary Sciences and Arts*, *1*(1), 100–110.

Noubiap, J. J., Agbaedeng, T. A., Nyaga, U. F., Lau, D. H., Worthley, M. I., Nicholls, S. J., & Sanders, P. (2022). Atrial fibrillation incidence, prevalence, predictors, and adverse outcomes in acute coronary syndromes: A pooled analysis of data from 8 million patients. *Journal of Cardiovascular Electrophysiology*, *33*(3), 414–422.

Page, R. L., Joglar, J. A., Caldwell, M. A., Calkins, H., Conti, J. B., Deal, B. J., Estes, N. A. M., Field, M. E., Goldberger, Z. D., & Hammill, S. C. (2016). 2015 ACC/AHA/HRS guideline for the management of adult patients with supraventricular tachycardia: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Journal of the American College of Cardiology*, *67*(13), e27–e115.

Sagris, M., Apostolos, A., Theofilis, P., Ktenopoulos, N., Katsaros, O., Tsalamandris, S., Tsioufis, K., Toutouzas, K., & Tousoulis, D. (2024). Myocardial Ischemia–Reperfusion injury: Unraveling pathophysiology, clinical manifestations, and emerging prevention

strategies. *Biomedicines*, *12*(4), 802.

Sarkar, A., & Ajijola, O. A. (2024). Pathophysiologic mechanisms in cardiac autonomic nervous system and arrhythmias. *Cardiac Electrophysiology Clinics*, *16*(3), 261–269.

Theofilis, P., Oikonomou, E., Chasikidis, C., Tsioufis, K., & Tousoulis, D. (2023). Pathophysiology of acute coronary syndromes—Diagnostic and treatment considerations. *Life*, *13*(7), 1543.

Tran, H. V, Ash, A. S., Gore, J. M., Darling, C. E., Kiefe, C. I., & Goldberg, R. J. (2019). Twenty-five year trends (1986-2011) in hospital incidence and case-fatality rates of ventricular tachycardia and ventricular fibrillation complicating acute myocardial infarction. *American Heart Journal*, *208*, 1–10.

Vlasova, V. P., Myshkina, N. A., & Fateeva, M. V. (2025). Cardiac Arrhythmias and Conduction Disorders in Geriatric Patients with Cardiovascular Comorbidity. *Medicine and Biotechnology*, *1*(1), 32–40.

World Health Organization. (2023). *Ischemic heart disease.* World Health Organization. https://www.who.int/news-room/fact-sheets/detail/ischemic-heart-disease

Zysman, M., Mahay, G., Guibert, N., Barnig, C., Leroy, S., & Guilleminault, L. (2023). Impact of pharmacological and non-pharmacological interventions on mortality in chronic obstructive pulmonary disease (COPD) patients. *Respiratory Medicine and Research*, *84*, 101035.