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Factors associated with mortality in patients with acute myocardial infarction treated at a hospital in the central-western region of Paraná state

Factors associated with mortality in patients with acute myocardial infarction treated at a hospital in the Middle West of Paraná

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Summary:

Acute myocardial infarction (AMI) is one of the leading causes of morbidity and mortality worldwide, constituting a significant public health problem. This observational, descriptive, and cross-sectional study aims to analyze the epidemiological profile of patients hospitalized for acute myocardial infarction in a hospital in Paraná state, Brazil. Furthermore, it seeks to deepen the understanding of associated risk factors and identify possible correlations between clinical and epidemiological variables that may explain the increased mortality in these patients.

Keywords: Epidemiology. Myocardial ischemia. Endothelial injury.

Abstract:

Acute myocardial infarction (AMI) represents one of the main causes of morbidity and mortality worldwide, constituting a significant public health problem. This observational, descriptive, and cross-sectional study aims to analyze the epidemiological profile of patients hospitalized for acute myocardial infarction in a hospital in Paraná state, Brazil. Furthermore, it seeks to deepen
understanding of associated risk factors and identifying potential correlations between clinical and epidemiological variables that may contribute to increased mortality in these patients.
Keywords: Epidemiology. Myocardial ischemia. Endothelial injury.

1. Introduction

Acute myocardial infarction (AMI) is one of the leading causes of morbidity and mortality worldwide represent a significant challenge for health systems. especially in regions with limited access to specialized services (Bett et al., 2022). Despite advances in early diagnosis and treatment strategies, mortality rates remain high. They are still high and influenced by multiple clinical, sociodemographic, and related factors. to the assistance provided (Bertelli et al., 2025).

Systemic arterial hypertension (SAH) is one of the main risk factors for serious complications. Due to its progressive, slow, and insidious course, the diagnosis of hypertension, as well as... as the start of treatment, they may be postponed (Brazilian Guidelines for Arterial Hypertension, 2020). Revised data from DATASUS, referring to the year 2017, recorded approximately

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1,300,000 deaths in total, of which 27.3% were attributed to CVD, with hypertension being the leading cause. associated with 45% of these deaths of cardiac origin (Borges *et al.,* 2023). With advancing age, the Cardiovascular diseases take on even greater relevance, since approximately 65% of Individuals over 60 years of age are hypertensive (Brazilian Guidelines for Arterial Hypertension). 2020).

Diabetes mellitus (DM) is an important independent risk factor for the occurrence of acute myocardial infarction (AMI), being associated with metabolic changes that favor atherogenesis and the instability of atherosclerotic plaques. Chronic hyperglycemia promotes endothelial dysfunction, increased oxidative stress, vascular inflammation, and formation of products advanced glycation end products, which contribute to progressive vascular damage (Bertelli et al., 2025).

Furthermore, diabetic patients frequently present with atherogenic dyslipidemia. characterized by high triglyceride levels, reduced HDL cholesterol, and a predominance of Small, dense LDL cholesterol, which increases cardiovascular risk. Diabetes mellitus is also associated with a pro-thrombotic state and increased arterial stiffness, which increases the likelihood of events. ischemic (Martins et al., 2026).

Smoking is directly related to the occurrence of acute myocardial infarction. (AMI), acting as an important modifiable risk factor for the disease. The substances Toxic substances present in cigarettes promote endothelial damage, increased oxidative stress, and Intensification of the vascular inflammatory process, favoring the development of atherosclerosis. Furthermore, tobacco contributes to increased platelet aggregation and a pro- Thrombotic, increasing the risk of thrombus formation in the coronary arteries. There are also effects hemodynamic changes, such as increased heart rate and blood pressure, which increase the myocardial oxygen demand (KIZILTUNÇ et al., 2022). Together, these mechanisms They explain the strong association between smoking and the triggering of ischemic events, such as IAM.

In this context, identifying factors associated with mortality in patients with AMI is crucial. It is essential to support more effective interventions, optimize care protocols and to guide public health policies (SLAVIERO et al., 2026). Variables such as age, sex, comorbidities, the interval between the onset of symptoms and care, as well as the quality of care. Hospital-based approaches have been extensively investigated in the literature, highlighting their impact. direct impact on clinical outcomes (Zimmermann et al., 2025).

However, there is a lack of regional studies that consider the particularities of each region. epidemiological and structural aspects of health services in specific areas, such as the Midwest. Paraná. Local analysis of these factors becomes essential to understanding the unique characteristics of

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care and its impact on mortality from myocardial infarction.

Therefore, the present study aims to analyze the factors associated with Mortality in patients with acute myocardial infarction treated at a hospital in the Midwest. from Paraná, contributing to the improvement of care strategies and the reduction of deaths. related to this condition.

2. Theoretical Framework / Results

The definition of AMI encompasses the occurrence of acute myocardial injury, associated with a condition... Clinical presentation with symptoms indicative of ischemia, suggestive changes on the electrocardiogram (ECG) or, alternatively, evidence from imaging tests that demonstrate alterations in cardiac contractility. or loss of viable myocardium (Nicolau et al., 2021).

In the atherosclerotic process, the lumen of the coronary arteries can become occluded. The plaque Atherosclerotic tissue, due to the local inflammatory process, can become unstable, exposing the thrombogenic material inside, which leads to the formation of a local thrombus (Zimmermann et al. (al., 2025). From this event, two outcomes are possible: partial occlusion of the arterial lumen, resulting in acute myocardial infarction without ST-segment elevation (NSTEMI), or total occlusion of the arterial lumen, leading to acute myocardial infarction with ST segment elevation (STEMI) (Baytugan; Kandemir; Bezgin; 2024).

Ischemic symptoms can manifest as retrosternal chest pain, with a sensation of... a tightening sensation, which may radiate to the upper limbs, jaw, back, and/or epigastrium. This Pain can occur both during physical exertion and at rest. Furthermore, there may be... The so-called ischemic equivalents are present, such as dyspnea, mental confusion, or fatigue. (Thygesen et al., 2018).

Upon arriving at the care unit with symptoms of chest pain typical of a syndrome. In cases of acute coronary artery disease (ACS), the patient must undergo the performance and interpretation of electrocardiogram in up to 10 minutes (Brazilian Society of Cardiology, 2015). Myocardial infarction can be... manifest with ST segment elevation (ST-segment elevation myocardial infarction) or without ST-segment elevation ST segment (STEMI). In STEMI, the patient presents with clinical signs of ischemia. associated with persistent ST-segment elevation or the presence of bundle branch block left main coronary artery bypass graft (LMCB) new. In NSTEMI, the patient manifests symptoms of ischemia without Persistent ST-segment elevation, but with elevated necrosis markers. myocardium, mainly troponin (Nicolau et al., 2021).

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The main markers of myocardial necrosis include CK-MB, myoglobin, and... troponin (Fiusa et al., 2025). CK-MB and myoglobin are considered early markers, although they exhibit lower specificity, they may increase in lesions of extracardiac tissues and generate false-positive results. Troponin, in turn, is the most specific marker for AMI, showing an increase approximately two hours after the onset of the injury, peaking at 24 hours and Normalization occurs between 7 and 14 days (Cegielka; Moreira; Traebert, 2025). Troponin dosage should to be performed serially, with collection at admission and three hours later, in order to evaluate the progression of the ischemic condition (Brazilian Society of Cardiology, 2015).

After diagnostic confirmation, based on electrocardiographic findings and markers In cases of myocardial necrosis, antithrombotic and myocardial reperfusion treatment should be instituted. (Kaplangoray et al., 2023). In both types of AMI, antithrombotic treatment should be Treatment was initiated immediately, with a combination of acetylsalicylic acid (ASA), heparin, and clopidogrel. In the case of STEMI, if the patient is in a unit with the capacity to perform For cardiac catheterization (CAT) and angioplasty, the procedure must be completed within 90 minutes. (door-to-balloon time) (Castro *et* al., 2022). If patient transfer is necessary and the time If the expected duration exceeds 120 minutes, thrombolysis with alteplase should be initiated initially. respecting the needle holder time of up to 30 minutes. For NSTEMI, performing the CAT scan is indicated, while thrombolysis is contraindicated (Bacchin *et* al., 2023).

2. Materials and Methods

This is an observational, descriptive, and cross-sectional study with a quantitative approach, conducted after the research project was approved by the Ethics Committee (Opinion No. 7,894,995). CAAE 91762025.1.0000.8947) on October 9, 2025.

The data were obtained from the analysis of 35 medical records available in the System. Tasy from the São Vicente de Paulo Charity Hospital in Guarapuava, Paraná. The sample was comprised of patients hospitalized for acute myocardial infarction, during the period from January to February. from 2026, over 18 years of age, with AMI confirmed by changes in the electrocardiogram (ECG) and/or through laboratory tests (troponin) collected at the time of admission. These were the criteria of Exclusion criteria: patients with a history of cardiovascular disease unrelated to acute myocardial infarction. myocardium; patients treated outside the analyzed period; patients under 18 years of age; and Medical records with incomplete important data.

The selection was non-probabilistic for convenience, with the aim of representing the characteristics of the population served. The variables analyzed were: sex, age, race/ethnicity,

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pre-existing comorbidities (systemic arterial hypertension and diabetes mellitus), type of MI (STEMI, STEMI and unstable angina), presence or absence of previous MI, previous or current smoking and clinical outcome (hospital discharge or death).

The collected data was stored in a Microsoft Excel spreadsheet and analyzed. through tabulation and calculation of absolute and relative frequencies (percentages). The research It used only data recorded in medical records, ensuring that the information from hospitalized patients were treated anonymously and confidentially, in accordance with ethical standards. in force, the application of the Free and Informed Consent Form (TCLE) is waived.

Because this is a cross-sectional study based on secondary data, there was no... There was no longitudinal monitoring of patients, nor were there any direct interventions on the study population. Nevertheless, the use of medical records made it possible to access relevant information about the healthcare, contributing to the understanding of the profile of patients affected by heart attack. Acute myocardial infarction patients treated at a referral center in the central-western region of Paraná.

3. Results and Discussion

The sample analyzed consisted of 35 patients hospitalized for acute myocardial infarction. myocardium, with an average age of 64.7 years, ranging from 51 to 82 years. These data highlight the predominance of individuals in older age groups, characterizing a population predominantly elderly, a profile consistent with the epidemiology of cardiovascular diseases, which They are more common with increasing age (Bacchin *et* al., 2023).

Regarding the distribution by sex, a predominance of males was observed. corresponding to 60% of the sample, while females represented 40%. The average age between The average life expectancy for men was 63.6 years, while for women it was slightly higher, with an average of 63.6 years. 66.4 years. This difference suggests a trend toward older age among female patients. female, which can be explained by hormonal and biological factors (Castro *et* al., 2022).

Analysis of the race/color variable showed a predominance of self-declared individuals. whites (31.4%); however, a high proportion of unrecorded data was observed, which limits A more in-depth analysis and comparisons with the literature. The incompleteness of this variable. This constitutes a significant limitation and can introduce bias in the interpretation of the data. epidemiological. Even so, considering the regional context of the Central-West region of Paraná, where The population is predominantly white; this finding may partially reflect the local demographic distribution. (Demographic Census, 2022).

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A high prevalence of systemic arterial hypertension (SAH) was observed in the sample.
studied, with presence in 34 of the 35 patients (97.1%), as described in Table 1. This finding
evidence shows that almost all individuals hospitalized for acute myocardial infarction
The patient had previously been diagnosed with hypertension, reinforcing its role as one of the main factors.
modifiable risk factors for coronary artery disease (Kaplangoray *et al.,* 2023). These data are
In line with the literature, which indicates a high frequency of hypertension in patients with myocardial infarction,
especially in elderly populations. Therefore, the importance of effective strategies is reinforced.
of tracking, monitoring and rigorous control of blood pressure in primary care, with
potential significant impact on reducing cardiovascular events (Brazilian Society of
Cardiology, 2015).

In the sample analyzed, it was observed that 17 of the 35 patients with myocardial infarction presented
diabetes mellitus (DM), which corresponds to approximately 48.6% of the studied population.
The finding indicates a high prevalence of diabetes mellitus (DM) among myocardial infarction patients at the collection site.
data, reinforcing the role of diabetes as an important cardiovascular risk factor. The presence of
Diabetes mellitus (DM) is associated with a higher risk of atherosclerotic disease, endothelial dysfunction, and worse outcomes.
clinical outcomes, which can contribute to both the occurrence and severity of a heart attack.
acute myocardial infarction (Bertelli et al., 2025).

In the sample analyzed, it was observed that most patients presented the first
an episode of acute myocardial infarction, which accounted for 27 of the 35 cases (77.1%). In
Conversely, 5 patients (14.3%) were in their second episode, while 3 patients
(8.6%) had already experienced 3 or more previous events. This data indicates that, although the
Although myocardial infarction is the most frequent type, a significant proportion of patients experience recurrence.
This suggests the presence of persistent risk factors or inadequate control of
comorbidities. Recurrence of ischemic events is associated with a worse prognosis and greater risk.
morbidity and mortality, reinforcing the importance of secondary prevention measures, such as adherence to
drug treatment, strict control of cardiovascular risk factors and
continuous clinical monitoring (Bett et al., 2022).

This analysis showed a predominance of individuals with a history of active smoking.
totaling 18 of the 35 patients (51.43%). In contrast, 6 patients (17.14%) were former smokers and
11 (31.43%) stated they had never smoked. These findings highlight a higher frequency of AMI among
current smokers, reinforcing the role of smoking as one of the main risk factors
Modifiable factors for coronary artery disease (KIZILTUNÇ et al., 2022). The lowest proportion of
The comparison of former smokers to current smokers may suggest a benefit associated with smoking cessation.
Smoking, although it does not completely eliminate cardiovascular risk.

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Table 1 - Sociodemographic characterization of hospitalizations for AMI in the evaluated service (n=35).

Variável	N	%
Sexo		
Masculino	21	60
Feminino	14	40
Idade		
50 - 60 anos	11	31,4
60 - 70 anos	14	40
70 - 80 anos	8	22,9
> 80 anos	2	5,7
Cor/raça		
Branco	11	31,4
Preto	7	20
Pardo	5	14,3
Sem registro	12	34,3
Comorbidades associadas		
Hipertensão arterial sistêmica	34	97,1
Diabetes mellitus	17	48,6
Infarto agudo do miocárdio		
Primeiro episódio	27	77,1
Segundo episódio	5	14,2
Terceiro ou mais episódio	3	8,5
Tabagismo		
Tabagismo ativo	18	51,4
Ex tabagista	6	17,1
Não tabagista	11	31,4

Source: Neiverth T., 2026.

Regarding the clinical presentation, there was a predominance of cases with ST-segment elevation. ST segment (STEMI), corresponding to approximately 18 patients (51%), followed by cases without ST-segment elevation (STEMI), with approximately 9 patients (26%), and by cases of Unstable angina, with 6 patients (17%), as described in Table 2. This profile indicates a higher risk of angina. frequency of more severe presentations, characterized by acute coronary occlusion.

Studies show that STEMI (ST-segment elevation myocardial infarction) is frequently associated with greater initial severity, but also with the greater benefit of reperfusion therapies. immediate, such as primary angioplasty (Verdoia, 2025). The proportion found is consistent with Hospital settings with access to hemodynamics, where there is a higher incidence of severe cases. Regarding clinical outcome, most patients were discharged from the hospital, totaling 30. individuals (85.7%), while 5 patients (14.3%) died. These results indicate a relatively low hospital mortality rate compared to historical AMI data, which may be related to the availability of therapeutic resources in the service, such as access

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to reperfusion therapy, the intensive care unit, and specialized management. The literature demonstrates a progressive reduction in mortality from myocardial infarction in recent decades, especially in centers with adequate structure (Nicolau, 2025). However, the observed death rate still reinforces The severity of the condition and the need for early diagnosis and timely treatment.

Table 2 - Characterization of AMI in the evaluated service (n=35).

Variável	N	%
Apresentação clínica		
Síndrome coronariana aguda com supradesnivelamento do segmento ST	20	57,1
Síndrome coronariana aguda sem supradesnivelamento do segmento ST	9	25,7
Angina instável	6	17,1
Desfecho clínico		
Alta hospitalar	30	85,7
Óbito	5	14,3

Source: Neiverth T., 2026.

In the analysis of the clinical outcome stratified by sex, it was observed that, among the 21 men Of the sample, 2 deaths occurred, which corresponds to a mortality rate of 9.5%. Among the 14 Among women, 3 deaths were recorded, resulting in a mortality rate of 21.4%. Data indicates a proportionally higher mortality rate among females. approximately twice as large as that observed in males. This finding, although based In a small sample, this is consistent with the literature, which describes worse outcomes in women with acute myocardial infarction, especially due to older age timing of the event, higher burden of comorbidities, and potential delays in diagnosis and treatment. treatment (Guida, 2024).

In the analysis of age in relation to clinical outcome, a difference was observed in the average age. among patients who were discharged from the hospital and those who died. The patients The survivors (n=30) had a mean age of 63.7 years, while those who died... (n=5) had a mean age of 70.6 years. These findings suggest a trend towards greater age among individuals with unfavorable outcomes, consistent with the literature, which indicates Advanced age as a significant negative prognostic factor in acute myocardial infarction. (Borges et al., 2023).

The higher mortality rate among older patients can be explained by multiple factors. including a higher burden of comorbidities, lower cardiovascular functional reserve, and greater probability of complications during hospitalization. In addition, older individuals They often present with atypical clinical manifestations and may exhibit greater delays in

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diagnosis and at the start of treatment (Thygesen et al., 2018).

In the analysis of the clinical outcome according to the type of coronary syndrome, it was observed... Variation in mortality rates among different groups. Among patients with acute myocardial infarction. In cases of myocardial infarction with ST-segment elevation (STEMI), there were 4 deaths in one A total of 18 patients, which corresponds to a mortality rate of 22.2%. In the group without ST-segment elevation (SS) resulted in 1 death in 9 patients (11.1%), while Among the 6 cases classified as unstable angina, there were no deaths.

The data suggest higher mortality among patients with ST-segment elevation myocardial infarction (STEMI). of the ST segment, which is expected from a pathophysiological point of view, since this condition is usually associated with complete coronary occlusion and greater extent of myocardial necrosis (Brazilian Society of Cardiology, 2015). On the other hand, cases without ST-segment elevation and Patients with unstable angina tend to present with less initial severity, although they are still associated with other conditions. a significant risk of adverse events. These findings are consistent with the literature, which demonstrates greater lethality in cases of STEMI, especially in the absence of Early reperfusion (Fiusa et al., 2025).

Final Considerations

The findings of this study highlight the epidemiological profile of hospitalized patients. The rate of acute myocardial infarction in the service analyzed is consistent with that described in the literature. characterized by a predominance of elderly male individuals with a high workload comorbidities, especially systemic arterial hypertension and diabetes mellitus, and by association with Smoking. It was observed that most cases corresponded to the first ischemic event. although a significant proportion of patients experienced recurrence, which reinforces the The importance of secondary prevention.

The predominance of presentations with ST-segment elevation and the association The higher mortality rate associated with this type of heart attack highlights the clinical severity of these cases and the need for... rapid and effective intervention. Despite this, the overall hospital mortality rate was relatively low, possibly reflecting the availability of adequate therapeutic resources, such as access to hemodynamics and specialized management. Still, factors such as advanced age and Female sex was associated with worse outcomes, highlighting groups that require greater attention. attention to clinical care.

The findings reinforce the importance of rigorously controlling cardiovascular risk factors. in primary care, as well as the implementation of effective early diagnosis strategies and

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timely treatment of AMI. Furthermore, the need to improve the quality of care is highlighted.

data recording, especially of sociodemographic variables, in order to enable more comprehensive analyses.

robust. Finally, studies with larger samples and multicenter designs are recommended.

to broaden the understanding of prognostic determinants and contribute to the improvement of

Health policies aimed at reducing morbidity and mortality from acute myocardial infarction.

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