Gaps in Public Health in Acute Myocardial Infarction: An Observational Study of Clinical and Knowledge Factors in Colombian Urban Population of High-Level Hospital

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Article

Gaps in Public Health in Acute Myocardial Infarction: An Observational Study of Clinical and Knowledge Factors in Colombian Urban Population of High-Level Hospital

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Abstract

Objective. To describe sociodemographic and clinical characteristics, as well as evaluate knowledge about the disease in patients with acute myocardial infarction (AMI) for the first time in a hospital of high complexity in Bogotá, Colombia. **Methods.** A cross-sectional descriptive study was conducted in adults aged 18 and over diagnosed with a first episode of an AMI, in which data were collected through structured surveys that evaluated the cardiovascular risk profile, recognition of symptoms, life habits and knowledge of symptoms. **Results.** 61 patients, 73.33% men, with an average age of 57 years (SD±13) were included. The majority had elementary education as their highest level (34.43%), and more than half reported monthly income of between 1 and 2 million pesos (COP$) (55.74%). Hypertension (68.85%), diabetes mellitus (40%), and smoking (52.46%) were the most prevalent risk factors. 72.13% underwent coronary angioplasty, 45.90% were able to define the concept of AMI, being more frequent among those with higher educational levels (85.71%). Recognition of critical symptoms was limited, 54.10% identified chest pain, 49.2% dyspnea and only 37.70% syncope. 80.30% recognized that a healthy diet is preventive, 71.10% were physically inactive. In addition, 41% reported self-medication and 59% delayed seeking medical attention. **Conclusions.** Patients with the first episode of an AMI in our study population in Bogotá face a double burden: modifiable risk factors and wide knowledge gaps, especially among those who have lower educational level and low income. These findings highlight the need for public health interventions with an equity approach, including culturally appropriate educational programs and policies that encourage timely recognition and response to cardiovascular symptoms. Overcoming these barriers is crucial to improving outcomes in AMI and reducing preventable mortality in vulnerable populations.

Keywords: myocardial infarction; health knowledge; risk factors; health equity

1. Introduction

Non-communicable diseases (NCD) represent one of the most important challenges for globally public health, and their effective approach requires not only responses from health care but also coordinated multisectoral efforts. In developing countries (such as Colombia), the increasing burden of cardiovascular disease (CVD), especially ischemic heart disease, demands innovative research agendas that analyze the biological and social determinants of chronic diseases and obesity, prioritizing sustainable development by reducing lost potential life years [1,2].

Globally, CVD is the leading cause of death, representing 31% of all deaths, with coronary heart disease responsible for about 13% of deaths (around 7.4 million cases). These figures reflect the

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disproportionate burden faced by low and middle-income countries, where 15 million of premature deaths occur annually (people between 30 and 70 years), of which 7 million occur in low-income regions [3–5].

In America, cardiovascular diseases cause more than 2 million deaths per year. In Colombia, chronic diseases represent 65% of catastrophic health spending. Among these, ischemic heart disease affects 1 in 10 adults and is the third cause of lost potential life years. Furthermore, CVD is the first cause of death. By 2022, ischemic heart disease was responsible of 21.1% of deaths in men and 18.8% in women. Adults over 60 represent more than 70% of deaths. [6,7]. The prevalence of ischemic heart disease as the leading cause of death from NCDs (17.7 million deaths annually), followed by cancer (8.8 million), respiratory diseases (3.9 million) and diabetes (1.6 million), highlights the urgency of strengthening public health interventions focused on prevention and management of these conditions [3]. Although its incidence is higher in men under 60, women have worse clinical outcomes. The delay in care and poor recognition of early symptoms of AMI are significant contributors to mortality. INTERHEART study evidence attributes more than 90% of infarction risk to 9 adjustable factors, reinforcing the importance of addressing lifestyle, diet, physical activity, smoking, psychosocial stress and other behavioral determinants within public health strategies [8].

Social determinants play a key role in burden and outcome of cardiovascular diseases, especially in low and middle-income countries such as Colombia. Factors such as educational level, income, working conditions, social support and physical environment directly influence the risk of developing and dying from coronary heart disease [9]. The World Health Organization recognizes that social determinants, such as education, work, income, healthcare access, and community environments, significantly affect behaviors, lifestyle, and outcomes in cardiovascular health. Within these determinants, formal education and socioeconomic status emerge as key proximal factors [10]. Several studies have demonstrated that increased literacy in cardiovascular health, understood as the ability to understand, interpret and apply information about heart diseases, is associated with better therapeutic adherence, improved access to healthcare and more favorable outcomes for chronic diseases [11–13]. This link highlights the importance of strengthening education and health promotion strategies to reduce cardiovascular inequities in contexts of social vulnerability.

Changes in behavior and lifestyle have demonstrated to be effective in preventing secondary cardiovascular events. Longitudinal studies show that adherence to guide-based therapies after AMI significantly reduces major adverse cardiovascular events (MACE) and associated health costs [14]. Similarly, literacy in cardiovascular health is associated with better control of hypertension and diabetes, lower rates of hospital readmissions and higher pharmacological adherence. In contrast, poor knowledge of ischemic heart disease especially in rural populations is linked to delays in seeking care, low risk perception and suboptimal health behaviors, regardless of family history [6,15,16].

Understanding patients' beliefs, perceptions and behaviors is essential to designing culturally relevant interventions that reduce CVD morbidity and mortality. The persistent gap in health education and follow-up in Colombia, particularly during the first month after discharge from hospital, increases the public health burden. Technology-based strategies, such as text messaging and remote nursing support, have demonstrated to be useful for strengthening adherence and promoting healthy behaviors, especially in the context of diabetes and cardiovascular disease prevention programs [17–19].

Individual characteristics such as age, sex, co-morbidities and socio-economic status directly influence adherence to healthy lifestyles. Follow-up consultations and referral to cardiac rehabilitation programs are critical for reinforcing behavioral change. However, barriers remain such as lack of clear medical guidance, low patient self-efficacy and social determinants such as low educational level, lack of family or community support and limited access to health services, especially for low-income people. [20,21].

Finally, the measures of quality of life strongly associated with health outcomes and hospital readmissions are influenced by multiple factors, including depression, anxiety, angina frequency,

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and adherence to treatment. The concept of "healthy adherent effect" highlights the importance of addressing both access to the health system and individual ability to adopt and maintain preventive behaviors, particularly in marginalized populations [22,23].

2. Materials and Methods

2.1. Study Design and Population

Between April and December of 2024, a descriptive cross-sectional study was conducted at Hospital Universitario Mayor Méderi, a high complexity center in Bogotá, Colombia. Adult patients (≥18 years) with clinical and/or angiographic diagnosis of acute myocardial infarction (AMI) for the first time during their stay in the coronary or intensive care unit were included. Those with a previous diagnosis of coronary disease, history of AMI, cognitive or psychiatric alterations or who did not agree to participate were excluded. Patients admitted to the hospital with the selection criteria were invited to participate consecutively and all participants signed informed consent for the study.

All patients who met the selection criteria during the study period were included; collecting a total of 61 subjects over six months, patient enrollment, data collection, and correspondence analysis, which was carried out according to the different groups of patients identified in the study.

2.2. Data Collection

Patients who met the selection criteria in emergency and cardiology services of Hospital Universitario Mayor Méderi of Bogotá were identified; clinical and demographic information was collected from patients, including age, gender, medical history and details of the acute myocardial infarction diagnosis through surveys and interviews where patient knowledge about risk factors, the disease and its management were assessed, these surveys were carried out by researchers.

A tool was defined that included the study variables in the platform REDCap at Méderi. In addition, the WHO's Progressive Method for the monitoring of risk factors for non-communicable diseases (STEPS) was implemented as one of the tools in the study.

2.3. Ethical Considerations

Study protocol was submitted and approved by the Méderi Research Committee and by Universidad del Rosario Research Ethics Committee (CEI-UR) on April 18, 2024. The CEI-UR approved under statement DVO005 2616-CV1878.

2.4. Data Analysis

A database was obtained which was reviewed and refined. Subsequently, a descriptive analysis of the clinical and demographic characteristics of the patient population was carried out; averages, standard deviations and distributions were calculated for the clinical and demographic variables. Variables of interest were adjusted, the responses to surveys or interviews were analyzed where their relationship with knowledge about this pathology was evaluated. Information collection was done on the platform REDCap.

Descriptive analysis techniques were applied using the statistical package STATA, version 17, licensed in Méderi. In categorical variables they were described as absolute and relative frequencies. In the case of continuous variables, they were presented according to their distribution. By its mean and standard deviation (normal distribution) or median and interquartile range (non-normal distribution). In the case of continuous variables, they were presented according to their distribution. By its mean and standard deviation (normal distribution) or median and interquartile range (non-normal distribution).

3. Results

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61 patients who consulted the Hospital Universitario Mayor Méderi and met the inclusion criteria were included. The average age was 67 (±13), with a predominance of men (73.77%). 34.43% had schooling up to the elementary level, 50.82% were married and 37.70% worked independently. In terms of income, 55.74% reported receiving between 1 and 2 million Colombian pesos per month (approximately USD $246 to $492). The majority belonged to socio-economic stratum 2 (40.98%). With respect to the history of behavior, 52.46% had a history of smoking, with a median age of initiation of 16.5 years and cessation at 21.2 years (SD 16.6). 80.33% reported drinking at least once a month, and 21.31% consumed alcohol in the 30 days prior to hospital admission (Table 1).

Table 1. Sociodemographic characteristics of the first-time AMI population at Méderi.

Variable	Description	N	%
Age	Media (SD)	67 (13)	-
Sex	Female	16	26.23
	Male	45	73.77
Education	Elementary School	21	34.43
	High School	19	31.15
	University	7	11.48
	Technical Degree	13	21.31
	Postgraduate Degree	1	1.64
Marital Status	Single	10	16.39
	Married	31	50.82
	Free union	14	22.95
	Divorced	2	3.28
	Widower	4	6.56
Occupation	Employee	11	18.03
	Self-employed	23	37.7
	Non-paid	3	4.92
	Homemaker	1	1.64
	Retired	22	36.07
	Unemployed (unable to work)	1	1.64
Patient income	No income	1	1.64
	Between $500,000 and $1 million	15	24.59
	Between $1.000.000 and $2.000.000	34	55.74
	Between $2.000.000 and $5.000.000	9	14.75
	Between $5.000.000 and $10.000.000	2	3.28
Social class	1	4	6.56
	2	30	49.18
	3	25	40.98
	4	2	3.28
Smoking	Yes	32	52.46
	No	29	47.54
Alcohol use	Yes	49	80.33
	No	12	19.67

Source: own elaboration.

Clinically, 85.25% had a history of cardiovascular disease, with hypertension being the most frequent (68.85%), followed by diabetes mellitus (27.87%) and dyslipidemia (26.23%). Obesity was identified in 14.75%. Median abdominal circumference was 88.3 cm; mean weight and size were 70 kg and 166 cm, respectively, placing BMI in the overweight range (25 to 29.9). The mean ejection fraction was 51% (range 18% to 69%) and the mean of affected coronary vessels was 2. The majority of cases (98.36%) were acute myocardial infarction of atherosclerotic origin. Regarding treatment, 72.13% required coronary angioplasty, 16.39% required myocardial revascularization surgery and

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only 3.28% received medical management. The most frequent risk factors were hypertension (68.85%), smoking (52.46%), dyslipidemia (50.82%), diabetes mellitus (40%), and family history of cardiovascular disease (37.70%) (Table 2).

Table 2. Clinical characteristics of the first-time AMI population at Méderi.

Variable	Yes (%)	No (%)
Cardiovascular history	52 (85.25)	13 (7.99)
High blood pressure	42 (68.85)	31 (19)
Diabetes mellitus	17 (27.87)	72 (43.99)
Dyslipemia	16 (26.23)	74 (45)
Obesity	9 (14.75)	85 (52)
Thrombus in the TTE	2 (3.28)	97 (58.99)
Valvular disorders	2 (3.28)	97 (58.99)
Other mechanical alterations (TTE)	0 (0)	100 (61)
Origin of coronary heart disease	Atherosclerotic 60 (98,36)	Thrombotic 2 (1)
Required angioplasty	44 (72.13)	28 (17)
Required cardiovascular surgery	10 (16.39)	84 (51)
Required medical management	2 (3.28)	97 (58.99)
Had atrial fibrillation	6 (9.84)	90 (54.99)
Requested admission to ICU	35 (57.38)	43 (25.99)
State of discharge: Alive (%)	61 (100)	0 (0)

Source: own elaboration.

70.49% reported frequent consumption of ultra-processed foods, and 71.10% did not perform regular physical activity, although 72.13% of the patients underwent percutaneous coronary intervention (angioplasty), and only 45.90% were able to define what is an acute myocardial infarction (Table 3).

Table 3. Cardiovascular risk factors in the first-time AMI population behavior at Méderi.

Variable	Yes (%)	No (%)
Smoking (Smokers)	32 (52.46)	29 (47.54)
Smoking (non-smokers)	29 (47.54)	32 (52.46)
Daily Smoking Frequency (%)	6 (9.38)	55 (90.62)
Age of smoking onset (mean)	16,5 years (IQR 18,5-14,5)	
Time without smoking (average)	21,2 years (SD 16,6)	
Alcohol use (consumer)	49 (80.33)	12 (19.67)
Alcohol use (non-consumer)	12 (19.67)	49 (80.33)
Frequency of use (weekly)	13 (21.31)	48 (78.69)
Frequency of use (monthly)	14 (24.59)	46 (75.41)
Frequency of use (biannual)	10 (16.39)	51 (83.61)
Use in the last 30 days (Yes)	13 (21.31)	48 (78.69)
Use in the last 30 days (No)	47 (77.05)	14 (22.95)
Days of fruit consumption	Median 3 (IQR 5-1)	
Servings of fruits	Median 1 (IQR 1-1)	
Days of vegetable consumption	Median 3 (IQR 6.5-2)	
Servings of vegetables	Median 1	
Physical activity (Yes)	15 (24.6)	46 (75.4)
Physical activity (No)	44 (72.1)	17 (27.9)
Days a week of physical activity	Median 3 (IQR 5-0)	
Time spent on physical activity (average)	Median 1 (IQR 3-0.7)	

Source: own elaboration.

The proportion of patients with adequate knowledge was higher among those who had a university or technical level (85.71%) compared to those who had only primary or secondary education (35.89%) ($p = 0.013$). Regarding the recognition of symptoms, 54.10% mentioned chest

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pain, 49.20% dyspnea, 37.70% syncope and less than 20% mentioned palpitations, nausea, or irradiated pain as possible warning signs. Only 39.34% indicated that they would call the emergency services immediately if symptoms were suggestive. Regarding knowledge about prevention, 80.30% recognized that a healthy diet could prevent AMI, but only 49.20% considered regular physical activity important. 41% reported frequent self-medication, and 59% reported having delayed medical consultation for symptoms by more than 6 hours (see Annex 1: IAM knowledge of the population with IAM for the first time at Méderi).

4. Discussion

There are substantial gaps in knowledge about the disease, recognition of symptoms and adoption of preventive measures in patients who experienced an AMI for the first time at a high complexity hospital in Bogotá. These deficiencies are more pronounced among people with lower levels of education and lower incomes, reflecting persistent structural inequities in access to health information and services [24,25].

The limited knowledge about acute myocardial infarction (AMI), evidenced by the fact that only 45.90% of respondents were able to define it correctly, reflects a problem previously documented in studies conducted in Latin America. This lack of timely recognition of symptoms has been associated with delays in seeking medical attention. In our sample, more than 59% of patients delayed their hospital admission for more than six hours from the onset of symptoms, suggesting a wasted therapeutic window for interventions such as primary angioplasty, whose effectiveness in reducing mortality depends to a large extent on its early application, having a substantial impact on early-onset complications and possible medium- and long-term effects [26–29].

Inadequate perception of symptoms is associated with worse clinical outcomes, higher rates of relapse and increased mortality at 30 days. Thoracic pain, the cardinal sign of AMI, was only identified by just over half of the patients, which is particularly worrying. These deficiencies compromise timely treatment, rehabilitation and secondary prevention efforts [25,30,31].

The disconnection between theoretical knowledge and real behaviors is highlighted, a phenomenon described in the paradigm of behavioral adherence, which states that it is not enough to inform but to transform habits through motivational and community interventions. [16,22,32]. Our results show this gap: although most identify risk factors, a high percentage of sedentary and ultra-processed food consumption persists despite recognizing these factors as risk for CVD and AMI.

As mentioned above, formal education and socio-economic position emerge as proximal social determinants of great relevance. In our study, knowledge about acute myocardial infarction (AMI) was significantly higher among people with university education, which is consistent with previous evidence that cardiovascular health literacy means the ability to understand, interpret and apply specific information on heart disease is an independent predictor of therapeutic adherence, timely access to health care and better outcomes in chronic diseases [9]. These findings suggest that not only general education, but also specific understanding of cardiovascular health plays a key role in the prevention and management of cardiovascular diseases. [33–35].

Although 72% received myocardial re-perfusion treatment, the lack of post-discharge continuing education, poor outpatient follow-up and absence of structured cardiac rehabilitation programs change the long-term impact of these acute interventions. In the Colombian context, characterized by fragmented care, high levels of self-medication (41% in our sample) and low risk perception, it is necessary to redesign AMI prevention and follow-up strategies [29,36].

5. Conclusions

This study shows significant gaps in knowledge about acute myocardial infarction, its prevention and the identification of symptoms and warning signs among patients who have experienced it for the first time. Factors such as low educational level, marginal urban background and lack of health promotion contribute to limited cardiovascular literacy, which has a negative

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impact on timely care, access to effective treatments and implementation of secondary prevention measures.

Against this outlook, it is essential to promote equity-oriented public health strategies that strengthen cardiovascular health literacy, therapeutic adherence, and early access to care, especially in economically vulnerable populations. There is also a need for community-based interventions that integrate educational, motivational, and structural elements, such as the availability of cardiac rehabilitation services, with the aim of improving quality of life and reducing the growing burden of cardiovascular disease in Colombia.

In line with this, there is a need to strengthen public policies that prioritize cardiovascular health education, the promotion of healthy lifestyle and equitable access to health services, particularly among the most vulnerable populations. Incorporating culturally relevant technology tools and communication strategies can significantly improve understanding, early detection, and adequate response to cardiovascular events.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.
Conflicts of Interest: The authors declare no conflicts of interest.

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