# Pre-hospital delay in acute myocardial infarction: judgement of symptoms and resistance to pain

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## Summary

**Objective:** To estimate the time of decision (TD) to look for medical care and the time of arrival (TA) at the health service for men (M) and women (W) suffering from acute myocardial infarction and to analyze the influence of the interpretation of pain and pain resistance behaviors during these times.
**Methods**: This is an exploratory research, performed at the university hospital in Salvador/Bahia. 43 W and 54 M were interviewed. To study the dependence among sociodemographic and gender variables, the Fisher Exact Test was used. To analyze times, a geometric mean (GM) was used. In order to verify the association between the GM of TD and TA and the judgment of pain, and between the GM of TD and TA and the behavior of resistance to pain, as well as to test the time of interaction between the gender variable and other variables of interest, the robust regression model was used. The statistical significance adopted was 5%.
**Results**: The GM of the TD for M was 1.13 h; for W, 0.74 h. The GM of the TA was 1.74 h for M and 1.47 h for W. Those who did not recognize the symptoms of AMI and presented behavior of resistance to pain had higher TD and TA, being the associations significant. Gender did not change the associations of interest.
**Conclusion**: The findings demonstrate the importance of health education aiming at the benefits of early treatment.

**Uniterms:** Myocardial infarction; gender identity; nursing care.

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## Introduction

Acute myocardial infarction (AMI) is an important cause of mortality in developed and developing countries. In Brazil, in 2010, the number of deaths caused by the disease totaled 79,668, corresponding to 7% of all deaths in that year. Out of these 79,668 deaths, 43,079 (54.1%) occurred in hospital, 26,676 (33.5%) at the person's home, 4,914 (6.2%) at other healthcare institutions, 2,851 (3.6%) in other locations, 1,995 (2.5%) on the streets or, in the case of 153 deaths (0.2%) the locations was unknown.[1]

Many of these fatalities can be avoided when the person receives fast and proper care. Early diagnosis and treatment save lives and, in survivors, improve quality of life by reducing the possibility of arrhythmic death and improving the left ventricular function after AMI.[2] Coronary reperfusion, either chemical or mechanical, can reduce mortality, but its benefit is time-dependent.[3,4] Thus, factors such as time and quality of care are critical in the first minutes after the onset of symptoms.

The issue of pre-hospital delay in situations of AMI (time interval from the onset of symptoms to arrival at hospital) is associated not only with factors such as availability of transportation, ability to access the hospital network, and quality of the emergency medical care system, but also depends on the individual who does not always recognize the symptoms and is reluctant to accept

the seriousness of his/her condition.[5,6] Cognitive and emotional factors related to the perception of both the individual and his/her associates regarding the AMI and its implications in everyday life[7] can influence attitudes towards the cardiovascular event in progress.[8]

In Brazil, there are few data available on pre-hospital care[9] and on decision making to seek care for people who have suffered this cardiovascular event. Furthermore, many studies are inconclusive about the reasons why men and women delay in seeking care when there are symptoms of the disease.[10] The social constructions of male and female appear to be implicated in attitudes towards one's own health, influencing the course of disease and mortality, and changing behaviors in relation to the disease itself and the use of health services. Therefore, social constructions of gender can differentiate behaviors to seek a health service in cases of AMI.[11]

In an effort to reduce mortality and minimize consequences such as physical, psychological and social disabilities, it is important to know the immediate actions of men and women in a cardiovascular event, as well as the factors involved in the decision for seeking care. Understanding what happens during this stage can guide actions of the healthcare team resulting in faster service.[12]

Based on the above, the study objectives were: to estimate time of decision (TD) for seeking medical care and the time of arrival (TA) at a health facility for men and women with AMI, as well as to analyze the influence of pain interpretation behaviors and pain resistance in these times.

## Methods

This is a cross-sectional study that employed quantitative and qualitative methods of analysis. The work was performed at a public teaching hospital that cares primarily for patients covered by the Brazilian Unified Health System (SUS, in Portuguese), located in Salvador, Bahia, where people with AMI are treated at outpatient and hospital settings.

Study participants were 43 women and 54 men, adults, conscious, oriented to time and space, who suffered heart attacks with pain and underwent medical treatment.

The data collection tool was developed by the authors and subjected to pre-test, being its suitability for the study observed. The first part of the form consisted of closed questions that provided sociodemographic information, the existence of previous AMI and place of occurrence of the event. The second part consisted of semi-structured questions, such as: a) Tell me about the pain you felt; b) What did you feel and/or think at the moment of pain?; c) What did you think the pain was?; d) How did you act when you felt the pain?; e) What means of transportation did you use to reach the first place sought for medical care?; f) Which was the first health service that you sought for medical care?; g) After the onset of pain, how long did it take for you to decide to seek medical attention?; h) After the onset of pain, how long did it take for you to get to the place you sought for medical care?

For a year, participants who met the inclusion criteria and agreed to participate in the study were interviewed in a private environment, ensuring them the clarification of the objectives of the investigation, confidentiality of personal identity and the right to leave the study whenever they found it necessary. The study was approved by the Ethics Committee of the Professor Edgar Santos University Hospital. All interviews were recorded and transcribed in order to ensure the reliability of the participants' speeches. The medical diagnosis was obtained from medical records and confirmed by the treating physician.

The time between onset of symptoms and the decision (TD) to seek medical care and time of arrival (TA) to the medical service were considered as dependent variables of the study. The independent variables consisted of the interpretation given to the symptoms and behaviors of resistance to pain in AMI. The gender of participants was considered as an interaction variable of the associations of interest (times and independent variables).

The technique of data analysis in the Grounded Theory methodology, developed by Glaser[13], of the Chicago School of Sociology, was used to analyze the content of the interviews. Thus, the first stage of data analysis consisted of carefully reading the answers to the semi-structured questions ("Tell me about the pain you felt," "What did you feel and/or think at the time of pain?" and "How did you act at the time of pain?") in order to understand and identify the pain resistance criteria in AMI, defined as the adoption of at least one behavior expressing postponement of the participants in the decision to seek medical care in the presence of symptoms. In this phase, the answers to the semi-structured questions were meticulously examined, line by line, to extract the codes that expressed resistance to pain in AMI. Through a comparison process, the codes identified were grouped by similarities and differences, forming the categories of resistance to pain.[13] A participant could be classified into one or more categories, if he/she expressed one or more

resistance behaviors. Subsequently, the absolute and percentage figures of those who exhibited these behaviors were calculated.

To study the dependence among sociodemographic and gender variables, the Fisher Exact Test was used. To analyze the TD and TA, we used the geometric mean (GM) to correct imbalances resulting from extreme time intervals reported by the participants. In order to verify the association between the GM of TD and TA and the judgment of pain, and also between the GM of TD and TA and the behavior of resistance to AMI pain, as well as to test the time of interaction between the gender variable and other variables of interest, the robust regression model was used. The statistical significance was 5% ($p \leq 0.05$) in all analyzes.

## Results

### Sociodemographic characteristics of the participants

The 97 study participants were predominantly from the metropolitan region of Salvador (59.8%) and other regions of Bahia (38.1%). Only 10.3% of them were white, all others were considered black and mixed race. Of the 54 men and 43 women, 19.6% were in the age group considered young for exposure to AMI, i.e., up to 50 years. The others were between 50 and 65 years (49.5%), or aged over 65 years (30.9%). The median age for men was 55.3 and for women, 61.5 years, so women have heart attacks later than men ($p = 0.038$). Married people (59.8%) prevailed, followed by separated, widowed and single (40.2%), being more frequent married men than married women ($p = 0.001$). Low educational level was characteristic because 17% were illiterate or did not have formal primary education (57.7%), highlighting that the variables gender and education were independent ($p = 0.809$). More than half were economically inactive (53.3%) being retired, on leave or pensioners of the National Social Security Institute (INSS), or were unemployed, being the variables gender and professional activity also independent (p=0.776). Regarding family income, 61.9% received up to five minimum wages, and the income of men was higher than that of women (p-value=0.005). Low wages, i.e., up to three minimum wages, prevailed especially for the latter. Most participants had no previous heart attacks (83.5%), and the number of events was not associated with gender ($p = 0.249$). Most of the events began at home (72.2%), followed by those that occurred on the streets (22.7%) and at work (5.2%), with no significant difference between the place of occurrence of AMI and gender.

### Means of transportation and health service sought

Most participants used their own car or a friend's car (96.9%) to reach a health facility. Three women (3.1%) used the ambulance service and none of the men requested this transportation. The means of transport was associated with gender.

As the first point of care, both men and women sought more frequently the hospital (68.0%). However, approximately one third of participants (27.8%) went to doctors' offices, health centers, and clinics or was seen by a doctor at home. Only 4.1% of patients did not inform what the health service first sought was. The location sought for care and gender were independent variables ($p = 0.368$).

### Judgment of symptoms and behaviors of pain resistance in AMI

Regarding the interpretation of the nature of pain, 23.7% of participants associated it to a heart problem. The remaining thought of other causes for the pain, interpreting it as a temporary discomfort, a stomach or lung problem, anger, cramps, worms, bursitis, and more, or even did not imagine what that was.

Of the 43 women, 8 (18.6%) interpreted the pain as cardiac in nature, of whom, 7.0% considered, since the onset of pain, the possibility of AMI, 7.0% associated it to some damage to the heart, and 4.6% thought that that was a hypertensive crisis. Of the 54 men, 15 (27.8%) judged the pain as cardiac in nature; of these, 6 (40.0%) considered, since the onset of pain, the possibility of AMI, 1 (6.7%) related it to angina pectoris, and 8 (53.3%) associated it with a heart problem. Gender did not affect the judgment of pain ($p = 0.226$).

Thirty-nine of 54 (72.2%) men and 32 (74.4%) of 43 women showed pain resistance behavior in AMI, and there was no significant association between gender and pain resistance behavior (p=0.126). In Box I, we observe that these behaviors are expressed by actions which are attempts to mitigate, bear and hide the pain, hoping it to improve and continue activities even with pain. For men, the average pain resistance behavior was 1.14; for women, 1.48.

**BOX 1** Categories and respective codes that expressed pain resistance behaviors in AMI for men and women

| Categories | Code examples | Men | Women | Total |
|---|---|---|---|---|
| Make attempts to mitigate the pain | Lying in a hammock, sipping a glass of milk, taking medicine, drinking tea, going to sleep, putting ice on the chest, bathing, taking sugar water, massaging the chest etc. | 29 | 22 | 51 |
| Bear the pain | Enduring the pain until it is no longer possible, feeling pain during all week, getting used to the strong pain, staying there with the pain, waiting until it was no longer possible, going to bed and moaning, getting quiet, moaning only, etc. | 13 | 19 | 32 |
| Increasing hope of improvement in pain | Thinking it would not get worse, waiting for relief, thinking that it would return to normal, thinking it would pass, believing it would be better when he/she woke up, etc. | 9 | 13 | 22 |
| Hide the pain | Keeping quiet, not speaking, not mentioning the pain, not telling anyone, etc. | 4 | 7 | 11 |
| Continue doing activities with pain | Experiencing pain and continuing journey, maintaining physical exertion without being able to, stopping to dig a hole when it was no longer possible, entering the church with son, etc. | 7 | 3 | 10 |
| Total of actions | | 62 | 64 | 126 |

**Association between TD and TA and the judgment of pain, and pain resistance behaviors in AMI and gender in this relationship**

The geometric means of TD (M = 54 and W = 41) and TA (M = 49 and W = 37) were, respectively, 0.94 h and 1.62 h. Women have GM for TD and TA lower than that of men (0.74 h and 1.47 vs 1.13 and 1.74 h). However, there was no statistically significant difference in the association between gender and TD (p=0.262) and gender and TA (p=0.588).

Table 1 shows that participants who interpreted the pain as cardiovascular in nature took much less time to decide to seek medical care (p = 0.007) and to reach a health facility (p=0.021). There was no relation between gender and interpretation of the nature of pain for the outcome TD.

Table 2 shows that participants who expressed pain resistance behaviors in AMI took longer both to decide to seek medical care (p = 0.000) and to reach a health facility (p=0.000). There was no relation between gender and pain resistance behaviors for the outcome TD (p = 0.098).

**TABLE 1** Judgment of the nature of symptoms associated to TD, TA and gender in this relation – Salvador - Bahia, 2013

| Judgment of the nature of symptoms in AMI | GM* TD | p** | GM* TD | | p** | GM* TA | p** | GM* TA | | p** |
|---|---|---|---|---|---|---|---|---|---|---|
| | n=95 | | M n=54 | W n= 41 | | n=86 | | M n= 49 | W n= 37 | |
| **Associated to a heart problem** | 0.45 | 0.007 | 0.46 | 0.40 | 0.390 | 0.92 | 0.021 | 0.91 | 0.96 | 0.474 |
| **Not associated to a heart problem** | 1.23 | | 1.82 | 0.84 | | 2.2 | | 2.47 | 1.63 | |

*Geometric mean; **p-value.

**TABLE 2** Pain resistance behavior in AMI associated to DT, to AT and to gender in this relation. Salvador- Bahia, 2013

| Pain resistance in AMI | GM* DT | p** | GM* DT | | p** | GM* AT | p** | GM* AT | | p** |
|---|---|---|---|---|---|---|---|---|---|---|
| | n= 95 | | M n= 54 | W n=41 | | n=86 | | M n= 49 | W n=37 | |
| **Yes** | 1.86 | 0.00 | 2.37 | 1.33 | 0.129 | 2.78 | 0.00 | 3.11 | 2.37 | 0.09 |
| **No** | 0.12 | | 0.16 | 0.18 | | 0.43 | | 0.35 | 0.55 | |

*Geometric mean; **p-value.

## Discussion

The study group consisted predominantly of people living in Salvador, Bahia, and surrounding municipalities, with little formal education, low monthly income, and professional inactivity. Women had heart attacks later than men, confirming the findings in the literature about the incidence of myocardial infarction according to gender.[14]

The lack of knowledge among participants about the severity of what was happening or the lack of resources available can be seen in the transportation means used (only 7% of the women used ambulances and none of the men used this resource), as well as the location where they sought medical attention (30.2% of the women and 25.9% of men sought the outpatient network). The fact that women and men did not request transportation using an equipped ambulance and specialized team to provide basic and/or advanced life support may indicate lack of information or appreciation of the importance of this resource.

All participants had chest pain as a clinical manifestation of their heart attacks, featuring an initial clinical presentation typical of AMI. It must be considered that the vast majority (83.5%) reported that this was the first episode of AMI, which began at home, and therefore they were not familiar with the symptoms, making it difficult to recognize the potential seriousness of the pain. This fact, coupled with low socioeconomic status[15], may explain why only 23.7% of the participants associated the pain to a heart problem. The categories that expressed pain resistance behaviors showed the attempts made to improve it, such as the use of beverages (e.g., tea, milk, sugar water), self-medication, improper movement, the hope of improvement, attempts to endure the pain, and more. All of these factors may have influenced the decision to delay seeking medical attention.

It is clear that many women and men decided to seek medical aid late, and were slow to get to the health service, which can be explained by the failure to acknowledge the cardiovascular event in progress and the pain resistance behaviors. Although some authors suggest that the lack of a typical clinical presentation in women could justify this delay, and the delay on the part of physicians to clinically diagnose the disease[16,17], it should be noted that all the women studied had myocardial infarction with classic chest pain.

We found greater delay among men, both in deciding to seek care after the onset of symptoms and reaching a health facility, although we have not found a statistically significant association between times and gender. It's worth noting that both among men and among women, a minority considered the possibility of a cardiovascular event being in progress (23.7%), noting that this minority took longer to seek care. Although the literature suggests that women may not feel vulnerable to AMI[18] and that cardiovascular diseases have been socially constructed as gender-specific, there was no interaction among gender, time of decision and judgment of the pain. Corroborating other studies[19-24], the association of symptoms to heart problems resulted in faster decision making and arrival at a place of treatment, indicating that the recognition of the severity of symptoms appears to be crucial for immediate search of health care.

Interestingly, it was noted that both women and men have endured the pain because accepting the impossibility of personal control over symptoms implies breaking with the usual patterns of everyday life[25]. Thus, the participants sought to endure the pain, relieve it, waited it to improve, concealed it and did not want to surrender to medical help immediately. Other studies have found that people who self-medicated[26], waited for the pain to improve, maintained higher self control[23] and felt ashamed to ask for help[27], taking longer to decide to seek a health service.

Despite the suffering caused by the pain, the different ways to resist it can be explained by a set of stereotype impregnated symbolism, resulting from the ideology of male and female in the social environment. Most of these constructions begin in childhood. The boys are meant to occupy the street, with freedom to come and go, to experience free sexuality, preparing to take over public spaces, control positions and a differentiated life in relation to home and family, often in the role of provider. Girls, in turn, are educated in the private space of home and family, they are prepared to be good mothers and wives.[12] From childhood, men learn to make decisions without showing weakness. Furthermore, the position of provider, head of household, protective father and hero are roles constructed according to gender patterns, linking the image of man to the reference of hegemonic masculinity. Within the social imaginary, such reference is translated into the stereotype of a capable man, who has no feelings, is strong and assertive. In such idealized models of masculinity, notions of invulnerability and risk behavior are seen as values of a masculine culture. Along with this, there are strong difficulties to verbalize health needs, for to do so can mean a possible demonstration of weakness and feminization before others.[11]

Girls, on the other hand, are educated in the private space of home and family, being prepared to be good mothers and wives. The games of childhood, unlike boys, in-

clude dolls, a doll house, broom and other household items that are needed to housework. In many cultures, the experience of motherhood associates the image of women to their ability to endure pain.[12] This ability has symbolic relationship to suffering and evolves from a historical past that suffers the interference of modern Western Judeo-Christian culture, which in the Bible highlights the ability of the Virgin Mary to suffer quietly and follow her son until death.[11] Such social constructions can reinforce, among women, the idea that pain should be tolerated, leaving them to moan, to try to relieve it with their own resources, or even to hide it. Resistance appears as an attempt to preserve everyday life, to play the role of mother, wife, grandmother, organizer of the domestic space, emotional mainstay of the family, and more.[11]

The categories of pain resistance require health professionals to act in the symbolic realm of men and women and make them aware of the risks of trying to maintain usual activities in situations of pain as a prodromal symptom of AMI, which may limit life definitely. This study shows that to reduce pre-hospital delay, integrated actions of the health teams are needed in terms of the factors involved in pain resistance to turn it into an action that results in benefit for men and women. Strategies required include those that mobilize people at greatest risk and those close to them to value the immediate search for service in situations of pain.

Another important aspect to be discussed is that the delay in reaching a health facility (1.62 h) observed in this study was certainly influenced by the time of decision, but may also reflect the delay of participants to optimize the departure from where they were and/or transportation to a health facility.

Importantly, those who resorted to a non-hospital unit (27.8%) also sought other instances of care until they could be hospitalized, resulting in longer times for diagnosis and effective therapy for cardiovascular event. Considering that 50% of deaths from AMI occur in the first hour of evolution, the percentage rising to 80% in the first 24 hours, and that the benefit of myocardial reperfusion is time-dependent[2], participants under these conditions were subjected to greater risk of morbidity and mortality and missed the opportunity to get the benefits of myocardial reperfusion administered within the first hour after the onset of symptoms.[2,14] Furthermore, one must consider that reaching a point of care does not mean immediate attention, it is necessary to consider the time it takes for the medical team to see the patient from the moment he/she enters the emergency room, and the time it takes the staff to deliver the therapy of coronary reperfusion (door-to-needle time). Therefore, it is essential that users of public health services have an emergency department with resources and procedure protocols for early and adequate care and treatment in AMI.

The means of transport used by the participants were completely inadequate and this aspect should be considered relevant as a strategy for raising a serious public health problem that needs to be corrected. The results showed that most AMI events occur at home, followed by the streets, and the majority of the participants do not live alone. Therefore, various community groups (businesses, schools, public buildings, relatives of people with higher risk, etc.) should receive special coverage in educational programs focusing on early care for the heart attack, as well as pedagogical actions that must be consistent with their learning opportunities. Training programs should include, in addition to knowledge for the management of victims in the first minutes of AMI, the development of an emergency action plan at home and at work, focusing on the ready recognition of symptoms all the way to the knowledge of a correct telephone number of the emergency medical assistance service in the city, in addition to the exact location of the nearest hospital with 24-hour emergency service and resources for AMI care. Health professionals, in addition to being trained for basic and advanced life support in the face of prodromal signs and symptoms of AMI, must work together to help reduce the time interval between onset of symptoms and the initiative of seeking a health service. Men and women need to be warned and be aware that not to interrupt their routines in a situation of pain can mean the risk of losing one's life or restricting it permanently.

## Conclusion

Most men and women did not correctly interpret the symptoms of AMI, showed acts of resistance to pain, used inadequate means of transportation and also sought inadequate health services. The GM of the TD for M was 1.13 h; for W, 0.74 h. The GM of the TA was 1.74 h for M and 1.47 h for W. Those who did not recognize the symptoms of AMI and presented behavior of resistance to pain had higher TD and TA, being the associations significant. The participants' gender did not change the associations of interest. The findings indicate the importance of health education in order to benefit from early treatment and taking into consideration the social constructions of gender. While participants have been able to reconstruct a past event, estimating the time of decision and arrival at a health facility may have been subject to recall bias in the explanation of these times. Another limitation refers

to the fact that the study evaluated only individuals who had suffered heart attacks with pain and survived the cardiovascular event. It is also important to note that the sample size may have affected the power of the study and that further investigations are needed to examine the influence of other socioeconomic and clinical variables on the times studied.


## Resumo

Retardo pré-hospitalar no infarto do miocárdio: julgamento dos sintomas e resistência à dor.

**Objetivo:** estimar o tempo de decisão (TD) para a procura de atendimento medico e o tempo de chegada a um serviço de saúde (TC) para homens (H) e mulheres (M) que sofreram infarto do miocárdio e analisar a influência da interpretação da dor e de comportamentos de resistência à dor nesse tempo.

**Métodos:** trata-se de pesquisa exploratória, realizada em hospital universitário de Salvador/BA. Foram entrevistados 43 M e 54 H. Para estudar a dependência entre as variáveis sociodemográficas e os sexos, empregou-se o Teste Exato de Fisher. Para analisar os tempos, utilizou-se a média geométrica (MG). Para verificar a associação entre a MG dos TD e TC e o julgamento da dor e entre a MG dos TD e TC e os comportamentos de resistência à dor, bem como para testar o termo de interação entre a variável sexo e as variáveis de interesses, utilizou-se o modelo de regressão robusto. A significância estatística adotada foi de 5%.

**Resultados:** a MG do TD para H foi de 1,13 h; para M, de 0,74 h. A MG do TC foi de 1,74 h para H e de 1,47 h para M. Aqueles que não reconheceram os sintomas do IAM e apresentaram comportamentos de resistência à dor apresentaram maior TD e TC, sendo as associações significantes. Os sexos não modificaram as associações de interesse.

**Conclusão:** os achados assinalam a importância da educação em saúde visando aos benefícios do tratamento precoce.


**Unitermos:** infarto do miocárdio; identidade de gênero; cuidados de enfermagem.

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