

Time of arrival of patients with acute myocardial infarction to the emergency department

Tempo de chegada do paciente com infarto agudo do miocárdio em unidade de emergência

Alessandra Soler Bastos¹, Lúcia Marinilza Beccaria², Ligia Márcia Contrin², Cláudia Bernardi Cesarino³

DOI: 10.5935/1678-9741.20120070

RBCCV 44205-1401

Abstract

Objectives: To characterize the profile of patients with acute myocardial infarction (AMI) treated at the emergency department and to verify the time of arrival of each patient (ΔT). Identify how the patient was transported and to correlate Delta-T (ΔT) with the treatment and the prognosis of each patient.

Methods: Cross-sectional survey involving 52 patients with AMI admitted to the Emergency Department of a Teaching Hospital took part in the study from July to December 2010. Data collection was performed using medical records and interviews.

Results: The majority of the patients were male with a mean age of 62.35 ± 14.66 years. The participants were married, with low education levels, family history of heart diseases, arterial hypertension, dyslipidemia, and a sedentary lifestyle. The symptoms presented were pains in the chest, epigastric region, or a chest discomfort associated to dyspnea and/or sudden sweating. The majority of the

patients were transported by ambulance. They were submitted to cardiac catheterization followed by angioplasty. Delta-T found was $9h45min \pm 18h9min$. In this study, the overall lethality was 3.85%.

Conclusions: The perception of signs and symptoms of AMI by the patient was a decisive factor when seeking out specialized treatment. Those with the lowest Delta-T presented better prognosis.

Descriptors: Myocardial infarction. Time. Emergency service, hospital.

Resumo

Objetivo: Caracterizar o perfil das pessoas com infarto agudo do miocárdio (IAM) atendidas em um serviço de emergência e verificar o tempo de chegada (delta T). Identificar como o paciente foi transportado e correlacionar o delta T com o tratamento e prognóstico do mesmo.

1. São José do Rio Preto Medical School (FAMERP), Approved at Intensive Therapy Improvement Course at Hospital de Base, São José do Rio Preto, SP, Brazil.
2. Full Professor at Specialized Nursing Department at FAMERP, São José do Rio Preto, SP, Brazil.
3. Full Professor at General Nursing Department at FAMERP, São José do Rio Preto, SP, Brazil.

This study was carried out at São José do Rio Preto Medical School, São José do Rio Preto, SP, Brazil

Correspondence address: Alessandra Soler Bastos
Rua Gabriel Janikian, 211 – São José do Rio Preto, SP
Brasil – CEP 15080-350
E-mail: lekasoler@hotmail.com

Scientific Initiation Scholarchip by FAMERP.

Article received on January 18th, 2012
Article accepted on July 16th, 2012

Abbreviations and acronyms

CAD	Coronary artery disease
AMI	Acute myocardial infarction
LUL	Left upper limb
SST	Segment elevation

Métodos: Pesquisa transversal, incluindo 52 pacientes admitidos na Unidade de Emergência de um Hospital de Ensino com diagnóstico de IAM, no período de julho a dezembro de 2010. A coleta de dados foi realizada por meio do prontuário e entrevista.

Resultados: A maioria dos pacientes era do gênero masculino, com idade média de $62,35 \pm 14,66$ anos, casada,

poucos anos de estudo, histórico familiar de doença cardíaca, hipertensão arterial, dislipidemia e sedentarismo. Os sintomas apresentados foram dor no tórax, região epigástrica ou desconforto torácico associado à dispneia e/ou sudorese súbita. A maioria dos pacientes foi transportada por ambulância e submetida a cateterismo cardíaco, seguido de angioplastia. O delta T encontrado foi $9h54min \pm 18h9min$. A letalidade global do estudo foi de 3,85%.

Conclusão: O reconhecimento dos sinais e sintomas do IAM pelo paciente foi fator determinante para a procura de atendimento especializado e aqueles com menor delta T apresentaram melhor prognóstico.

Descritores: Infarto do miocárdio. Tempo. Serviço hospitalar de emergência.

INTRODUCTION

Epidemiological data from major societies point cardiovascular diseases as those with increased mortality and morbidity [1,2]. There is expectation that in 2020, 40% of deaths are related to them. [3] According to American research, more than 12 million people have some heart disease and more than one million presents an acute myocardial infarction (AMI) per year, resulting in 466,000 deaths related to coronary artery disease (CAD) [4]. In Brazil, cardiovascular diseases are responsible for 31% of deaths from known causes [5] and in this set, the AMI is worrying society and public health authorities, due to the impact on mortality and the number of hospitalizations in whole country [6,7], being the major cause of attendance in emergency units [4].

Two-thirds of sudden deaths from heart disease occur outside the hospital and only 20% of people who reported acute chest pain to the emergency arrive two hours before the start of these signals [6,8]. One factor that contributes to the reduction of this high mortality from AMI is the rapid treatment of these patients after the onset of symptoms [6]. Therefore, it is necessary to prepare the emergency services and the professionals involved, so that the care be guided and the diagnosis accurate. [3]

Studies indicate that, in Brazil, patients with symptoms of MI did not immediately seek health services, by not

recognizing its symptoms, because there is no specialized services and first aid and even due to a poor public transportation, making difficult the arrival of these people to the hospital. [8] These obstacles are challenges of public health authorities, because the AMI is considered a long-term illness, demanding actions, procedures, healthcare services and, consequently, higher costs, and causing huge losses to society [5,8].

The knowledge of the arrival time of patients with symptoms of AMI to specialized services, as well as the identification of the difficulties faced by them, can subsidize nursing professionals and guidance to help patients, their families and the community [3,9]. Therefore, this study aimed to characterize the profile of people with AMI treated in an emergency department and check the arrival time (delta T). Identifying how the patient was transported and correlating the delta T with its management and prognosis.

METHODS

Cross-sectional study in a teaching hospital in northeastern São Paulo, which provides services to different medical specialties, and is intended to provide health services, education and research. Data were collected at the Emergency Unit, where patients are admitted in critical health, accident victims, politraumas, cardiac arrests and other who require immediate care. The sample consisted of

52 patients older than 18 years with AMI who were admitted to this unit during the period from July to December 2010. We excluded patients younger than 18 years, those who did not agree to participate in the study and those with deficit or mental retardation.

Survey of the profile of patients with AMI was performed through hospital records, in accordance with the following sociodemographic and clinical variables: gender, age, marital status, weight, height, education, occupation, family history, origin, with whom the patient lives, smoking, hypertension, diabetes, dyslipidemia and exercise. An interview about arrival time (delta T), means of transport and treatment and prognosis after AMI.

The research project was approved by the Research Ethics Committee of the São José do Rio Preto Medical School-FAMERP - Protocol No. 0176/2010.

For the statistical data of the epidemiological profile percentages were used, with statistical approach of chi-square test for qualitative variables, and univariate comparison tests, for quantitative variables, the Mann-Whitney and Kruskal-Wallis tests, all to the level of significance of 0.05.

Table 1. Sociodemographic profile of patients with AMI. São José do Rio Preto - SP, Brazil, 2011: percentage.

Variables	N	%
Gender		
Male	40	76.9
Female	12	23.1
Age (years)		
30-59	22	42.3
60-90	30	57.7
Marital status		
Married	34	65.4
Widower	10	19.2
Single	8	15.4
Occupation		
Retired	24	46.2
Service care department	15	28.8
Housewife	7	13.5
Merchant	5	9.6
Unemployed	1	1.9
Schooling		
from 0 to 7 years	31	59.6
from 8 to 11 years	19	36.5
More than 11 years	2	3.9
BMI		
Overweight	18	40
Normal	16	35.6
Obesity	10	22.2
Malnutrition	1	2.2

Table 2. Risk factors presented by patients with AMI. São José do Rio Preto - SP, Brazil, 2011: percentage.

Clinical Variables	N	%
Sedentary	43	82.79
Hypertension	40	76.92
Family History	30	57.69
Dyslipidemia	24	46.15
Smoking	19	36.54
Overweight	18	40*
Previous CAD **	14	26.92
Diabetes Mellitus	11	21.15

* Calculation performed with 45 patients, because 7 of them could not report weight and height; ** Coronary Artery Disease

RESULTS

Regarding the socio-demographic profile (Table 1) of 52 patients with AMI, we observed: males (76.92%) with a mean age of 62.35 ± 14.66 years, married (65.38%), retired (46.15%), with a few years of study, overweight (40%), from the region of São José do Rio Preto (57.69%).

With regard to clinical aspects, the majority of patients reported a family history of heart disease (57.69%), hypertension (76.92%) and inactivity (82.79%) (Table 2).

Regarding symptoms, 31 (59.62%) patients were associated with chest pain or chest discomfort, pain radiating to the left upper limb (LUL) and dyspnoea and/or sudden sweating, 19 (36.54%), pain chest, LUL, epigastric or chest discomfort and only two (3.85%), dyspnea and/or sudden sweating. Of these, 32 (61.54%) patients remained with symptoms for more than 20 minutes, what motivated them to seek medical attention, and 36 (70.59%) were transported by the ambulance service to the county and 15 (29.41%) with the family car. With regard to the demand for other services before being treated at the emergency Teaching Hospital, it was found that 47 (90.38%) first sought treatment in the Basic Health Units.

About evolution of these patients in the hospital, it was found that 20 (39.22%) underwent cardiac catheterization followed by angioplasty, 19 (37.25%), only catheterization, seven (13.7%), catheterization followed by coronary artery bypass grafting and five (9.8%) underwent clinical treatment. Regarding prognosis, we found that 50 (96.2%) were discharged, while two (3.8%) died.

Taking into account the time (delta T) that patients with AMI spent to arrive in this emergency department, we observed mean $\pm 9h54min$ $18h9min$, and delta T minimum was 23 minutes and the longest 96 hours (Table 3).

Table 3. Descriptive statistics of the arrival time of a patient with AMI. São José do Rio Preto - SP, Brazil, 2011: time.

Variable	N	Md	Min	Max
Delta T	52	9h54min ± 18h9min	4h8min	23min 96h

Table 3 shows that the results of the arrival time of the patients had high discrepancy, showing a high coefficient of variation of around 183.33%, attributed to the very high values of time of arrival which influenced the mean value of the distribution, increasing it in relation to the median value, so the time of arrival presented asymmetric distribution.

In relation to pain intensity, on an analog scale of 0 to 10, where zero means no pain and 10 worst pain experienced, there was an average of 6.9 with a median of 8, assuming that the patients felt pain from median to high intensity, and 50% of them characterized their pain scores between 8 and 10.

Table 4. P values for the associative test between variables: smoking, hypertension, prior CAD, schooling, seeking for another service, escort, and self-medication and variables: symptoms present at admission and patient outcome. São José do Rio Preto - SP, Brazil, 2011.

Variables Characterization	Variables response		
	Symptoms present	At admission	Evolution
Smoking	0.259	0.066	0.606
Hypertension	0.05	0.359	0.79
Previous CAD	0.782	<0.001	0.637
Schooling	0.5	0.524	0.078
Another service *	0.024	0.768	
Scort	0.217	0.901	0.511
Self-Medication	0.712	0.334	0.034

* Refers to Primary Care: Basic Health Unit and Emergency Care Unit

Table 4 shows the P values for the associate chi-square test between the main variables. It was found that there was an association between hypertension and presentation of symptoms presented by patients and between prior CAD and symptoms at admission.

Most patients with high blood pressure (69.7%) presented association between all symptoms, while non-hypertensive patients (66.67%) reported chest pain, LUL, epigastric or chest discomfort, showing that a higher number of symptoms when compared to normotensive individuals.

With respect to patients with prior CHD, also reported symptoms at admission (71.43%). The association between CAD and prior symptoms shows that patients who have experienced an AMI or other coronary artery disease were able to identify symptoms early and go quickly to the emergency room.

In the association of prognosis in relation to self-medication, patients who had a favorable clinical treatment were excluded from the analysis. Table 5 shows the percentage of prognosis in relation to self-medication. The data demonstrate that patients who self-medicated had worse outcomes when compared to those not self-medicated.

In Table 6, we performed comparative assessment that has demonstrated the results of the variable delta T in relation to social and clinical characteristics of the patient and observed a significant association between delta T and the variables: symptoms on admission, progression and self-medication. When compared delta T and symptoms, means of transport and presence of accompanying or not, it was found that there is a significant association.

When comparing the delta T with symptoms on admission, prognosis and self-medication, there was a significant association between these variables (Tabela7).

Table 5. Percentages of prognosis in relation to self-medication of patients with AMI. São José do Rio Preto - SP, Brazil, 2011.

Self Medication	Prognosis			Total
	Catheterization	Catheterization and angioplasty	Catheterization and CABG	
No	17 (53.13%)	12 (37.50%)	3 (9.38%)	32 (71.11%)
Yes	2 (15.38%)	7 (53.85%)	4 (30.77%)	13 (28.89%)
Total	19 (42.22%)	19 (42.22%)	7 (15.56%)	45 (100%)

P Value = 0.034

Table 6. Descriptive statistics of delta T for symptoms, marital status, prognosis, mode of transport, escort and self-medication of patients with AMI. São José do Rio Preto - SP, 2011, Brazil: number, time and P value.

Characteristics		N	Delta T	P
Symptoms	Pain and/or chest discomfort	19	14h14min ± 24h9min	0.284
	Pain and / or discomfort plus dyspnoea	31	7h21min ± 13h41min	
Marital status	Married	34	11h31min ± 21h40min	0.042
	Single / Divorced	8	4h1min ± 2h35min	
	Widower	10	9h5min ± 9h54min	
Evolution	Catheterization	19	6h8min ± 13h4min	0.014
	Cat and Angioplasty	20	10h29min ± 16h42min	
	Cat. and CABG	7	23h43min ± 33h2min	
Transportation	Ambulance	36	7h42min ± 11h35min	0.444
	Car	15	15h34min ± 28h33min	
Scort*	Yes	40	10h29min ± 20h15min	0.427
	No	12	7h56min ± 8h15min	
Self Medication	Yes	14	20h11min ± 28h40min	0.01
	No	37	6h12min ± 10h38min	

* Monitoring during transport of the patient to the unit

Table 7. Descriptive statistics of delta T and the pain score for the presence of symptoms on admission of patients with AMI. São José do Rio Preto - SP, 2011: time and P value.

Variables	Symptoms on admission	Md	Min	Max	P	
Delta T	Yes	4h1min ± 5h17min	2h44min	23min	27h	0.042
	No	21h24min ± 29h36min	6h11min	41min	96h	
Pain score	Yes	7.33 ± 2.87	8	0	10	0.069
	No	4.6 ± 4.25	5.5	0	10	

DISCUSSION

The majority of the study population was elderly, male, with a few years of study and living in neighboring municipalities of City where the emergency unit of the teaching hospital was located, which corroborates research on Dante Pazzanese risk score for acute coronary syndrome, that observed the older age associated with the occurrence of adverse coronary events, as well as the low level of education of patients [9].

Regarding risk factors, most patients had sedentary

lifestyle, hypertension, dyslipidemia and family history. Studies on acute coronary syndrome report that most AMI patients had three or more risk factors and the most prevalent were: hypertension, dyslipidemia and family history, and physical inactivity showed no relevance [3,4]. In this study, physical inactivity was reported by 82.79% of patients and smoking by 36.54%, showing no significance when related to the studied variables.

The importance of time elapsed between the onset of AMI up to its care in an emergency department (delta T) is justified by the need for immediate reperfusion

interventions, aiming at restoration of coronary blood flow, thus contributing to increased survival of these patients [10-12].

The delta T found in this survey was 9h54min \pm 18h9min, much higher than reported in the study by Franco et al. [13] (2h55min \pm 3h59min) and Muller et al. [11] (4h15min \pm 2h7min). This fact can be explained by the fact that 84.61% of the patients are from other cities and 26.92% of them have self-medicated before seeking health care ($P = 0.01$). However, observing the total number of patients residing in other locations, it was found that 31.8% of them are from the neighboring city, which is about 16 minutes drive from the emergency services investigated.

A study performed in Rio de Janeiro, involving patients diagnosed with AMI with ST segment elevation (SST) showed that 67.7% reached the emergency room after three hours of the onset of the first symptom and 8.4% after 12 hours [3]. Another study performed in Rio Grande do Sul showed that 88% of patients with SST sought emergency care within an hour, and the average was 3h59min to 2h55min. They also found that patients did not realize that the chest pain as a heart event took longer to arrive the health service than those who identified [13].

According to the Directive IV of the Brazilian Society of Cardiology on the Treatment of AMI [10], some factors contributing to the delay of the patient to seek help, such as: denial that that chest pain is of cardiac origin, association of pain with other pre-existing chronic conditions, lack of knowledge on benefits if quick care, urgent care not available to all patients. Other studies confirm that female patients with low socioeconomic status, and self-medicated with older age, take longer to arrive to specialized service [10,13].

In this study, we found that single or divorced patients had lower delta T when compared to married or widowed, which agrees with the study by Franco et al. [13], which also showed that married persons and widows had more time compared to single and divorced. However, there was no significant association between delta T and the variable marital status ($P = 0.759$), also observed in the study by Franco et al. [9] that showed $P = 0.006$. Data from a study comparing patients with AMI regarding their time of arrival at the emergency unit found that those who sought medical care for more than six hours, and were on average older (75 \pm 7 years), women and non-whites [14].

Regarding symptoms, it was found that patients with chest pain radiating to LUL, epigastric region or chest discomfort showed higher delta T compared with those who reported these symptoms together with sudden dyspnea and sweating ($P = 0.284$). While there is no significance between this finding, it can be said that patients with higher symptoms, sought the emergency room faster than those with mild or moderate symptoms.

When the individual recognizes the signs and symptoms of AMI or has already undergone a previous experience of arterial disease, it significantly lowers the delta T [13]. Similarly, this study found that patients with prior CHD, showed lower delta T (4h56min \pm 6h29min) and those who had not (11:56min \pm 21:40min) ($P = 0.646$). Other research indicates that patients who take longer for the medical visit had higher prevalence of diabetes and previous angina, and less history of myocardial infarction, coronary angioplasty or cardiac surgery [14].

The association between prior CAD and symptoms at admission was present in 71.43% of patients ($P < 0.001$), suggesting that they had knowledge of such a symptom and therefore arrived quickly to the emergency room. Patients who believe their symptoms are related to their heart seek help more quickly than those who attribute their symptoms to other causes [15].

In a study performed on factors that influence the demand for emergency services by patients with AMI, 33% had symptoms as first decision facing the self-medication, and presented a delta T of 3h36min \pm 2h24min. In this study, 26.92% of patients who self-medicated, with delta T from 20:11min \pm 28h40min, while those not taking medication on their own showed lower delta T, but greater than the delta T from mentioned study of patients who self-medicated. The P value for this comparison was 0.01, assuming the existence of significant differences between the arrival time and the attitude of self-medication.

It was found that patients who self-medicated had worse during hospitalization when compared to non self-medicated. The first group progressed to cardiac catheterization followed by percutaneous coronary intervention (53.85%) or CABG (30.77%). The second group underwent cardiac catheterization (53.13%), indicating that patients who self-medicated, due to higher delta T, had worse outcomes during hospitalization than those who did not self-medicated and arrived at the hospital soon.

With respect to the means of transport used in the study of Muller et al. [11], 28.1% of patients were transported by ambulance and 57.5%, on their own, however, there was no time difference between them. The study by Franco et al. [13] demonstrated that patients transported by ambulance had a higher delta T when compared to transported by car, data that are opposed to this study, in which 70.59% were transported by ambulance and car were 29.41%, being the delta T of patients transported by ambulance relatively smaller than the car. It was also found that most patients was accompanied by wife or child.

In an emergency situation, patients who call for an ambulance are dependent on many factors before being rescued, such as: ambulances are available, the distance to be traveled and patients living with other people who can call for help. [13] Being transported by ambulance was not

significant for reducing the service time compared to those who were transported by car. [11] In this study, it was also not possible to verify significance ($P > 0.05$).

The delta T of patients referred by ambulance was lower than those transported by car. This fact can be explained by the fact that they seek for other health services, presenting a high delta T. On the other hand, with respect to patients who called for an ambulance, most first sought other health services and, by the presence of symptoms suggestive of AMI, professionals from such health units headed for the emergency room, to perform diagnosis and treatment.

Regarding the treatment used for patients with AMI, it is known that this is time-dependent, according to the time between the first symptoms, care and therapy to be adopted [10]. It was found in this study, that patients undergoing only cardiac catheterization presented the delta T of 6h8min \pm 13h4min. On the other hand, patients who underwent cardiac catheterization followed by percutaneous coronary angioplasty obtained delta T of 10:29min \pm 16:42min and between those who had undergone catheterization followed by coronary artery bypass grafting the delta T was 23:43min \pm 33h2min ($P = 0.014$).

It was observed that the time has a direct influence on the choice of treatment after patient admission. Thus, we can say that patients who do not receive immediate specialized care have a worse prognosis when compared to those who receive treatment quickly. In this study, most patients were discharged from hospital and only two has evolved into death (3.85%). Comparing the lethality with other studies, it was smaller than that found (9.5% and 4.8%) [3,4].

In the present study, coronary artery bypass grafting was performed slightly (13.73%). In a similar study, there was agreement as to the percentage found (13.7%). In a study performed in Rio de Janeiro, the rate of CABG was 8%. One possible explanation for the low number of surgeries for the treatment of AMI, was the fact that patients are elderly, so with collateral circulation, and also by the surgical risk and complexity of the surgery. The use of drugs such as thrombolytic and nitrates, and coronary angioplasty are the best treatment options for these patients [3,16].

One of the most characteristic symptoms of AMI is the angina caused by myocardial ischemia, which is often severe and may be relieved by rest and nitrates. The symptom of chest pain is present in 75% to 85% of patients with AMI, which is the factor of greatest significance for these people to seek for help. [9] In this study, it was found that 96.15% of patients had angina, occurring an average score of 6.9 points, with a median of 8 points, demonstrating that these patients had pain of medium to high intensity.

The limitation of this study was the small sample size, which may have influenced the results, however, they

represent the patients treated in this emergency department during the study period.

CONCLUSION

The profile of patients with AMI in this study were men, older, married, with a few years of study, retirees, presenting overweight, coming from the neighboring cities of the emergency unit of the teaching hospital studied. Regarding risk factors, most patients had a family history of heart disease, hypertension, dyslipidemia and physical inactivity.

The recognition of the signs and symptoms of AMI by the patient was determinant for seeking specialized care. The symptoms presented were chest pain, epigastric or chest discomfort associated with dyspnea and/or sudden sweating. Most patients were transported by ambulance and underwent cardiac catheterization, followed by angioplasty. The delta T found was 9h54min \pm 18h9min. The overall mortality in the study was 3.85%.

It was found that patients undergoing only cardiac catheterization presented the lowest delta T (6h8min \pm 13h4min) and those who underwent cardiac catheterization followed by coronary angioplasty or coronary artery bypass grafting had higher delta T (10:29min \pm 16:42min and 23:43min \pm 33h2min, respectively), or that is, patients with low delta T showed better prognosis.

REFERENCES

1. Nicolau JC, Baracioli LM, Serrano Jr. CV, Giraldez RR, Kalil Filho R, Lima FG, et al. A influência do plano de saúde na evolução a longo prazo de pacientes com infarto agudo do miocárdio. *Arq Bras Cardiol.* 2008;91(6):377-81.
2. Wainstein R, Furtado MV, Polanczyk CA. Trombólise pré-hospitalar no infarto agudo do miocárdio: uma alternativa factível para o Brasil? *Arq Bras Cardiol.* 2008;90(2):77-9.
3. Soares JS, Souza NRM, Nogueira Filho J, Cunha CC, Ribeiro GS, Peixoto RS, et al. Tratamento de uma coorte de pacientes com infarto agudo do miocárdio com supradesnívelamento do segmento ST. *Arq Bras Cardiol.* 2009;92(6):464-71.
4. Santos ES, Minuzzo L, Pereira MP, Castillo MTC, Palácio MAG, Ramos RF, et al. Registro de síndrome coronariana aguda em um centro de emergências em cardiologia. *Arq Bras Cardiol.* 2006;87(5):597-602.

5. Malta DC, Cezário AC, Moura L, Morais Neto OL, Silva Junior JB. A construção da vigilância e prevenção das doenças crônicas não transmissíveis no contexto do Sistema Único de Saúde. *Epidemiol Serv Saúde*. 2006;15(3): 47-65.
6. Mussi FC, Ferreira SL, Menezes AA. Vivências de mulheres à dor no infarto do miocárdio. *Rev Esc Enferm USP*. 2006;40(2):170-8.
7. Escosteguy CC, Portela MC, Medronho RA, Vasconcellos MTL. O sistema de informações hospitalares e a assistência ao infarto agudo do miocárdio. *Rev Saúde Pública*. 2002;36(4):491-9.
8. Melo ECP, Travassos CMR, Carvalho MS. Infarto agudo do miocárdio no Município do Rio de Janeiro: qualidade dos dados, sobrevida e distribuição espacial. *Cad Saúde Pública*. 2007;16(2):121-3.
9. Santos ES, Timerman A, Baltar VT, Castilho MTC, Pereira MP, Minuzzo L, et al. Escore de risco Dante Pazzanese para síndrome coronariana aguda sem supradesnível do segmento ST. *Arq Bras Cardiol*. 2009;93(4):343-51.
10. Piegas LS, Timerman A, Feitosa G, Rossi Neto JM, Nicolau JC, Mattos LA, et al. Sociedade Brasileira de Cardiologia. IV Diretriz da Sociedade Brasileira de Cardiologia sobre tratamento do infarto agudo do miocárdio com supradesnível do segmento ST. *Arq Bras Cardiol*. 2009;93(6 supl. 2):e179-e264.
11. Muller LA, Rabelo ER, Moraes MA, Azzolin K. Fatores de atraso na administração de terapia trombolítica em pacientes com diagnóstico de infarto agudo do miocárdio em um hospital geral. *Rev Latinoam Enferm*. 2008;16(1):52-6.
12. Pesaro AEP, Campos PCGD, Katz M, Corrêa TD, Knobel E. Síndromes coronarianas agudas: tratamento e estratificação de risco. *Rev Bras Ter Intensiva*. 2008;20(2):197-204.
13. Franco B, Rabelo RE, Goldemeyer S, Souza EN. Patients with acute myocardial infarction and interfering factors when seeking emergency care: implications for health education. *Rev Latinoam Enferm*. 2008;16(3):414-8.
14. Sheifer SE, Rathore SS, Gersh BJ, Weinfurt KP, Oetgen WJ, Breall JA, et al. Time to presentation with acute myocardial infarction in the elderly: associations with race, sex, and socioeconomic characteristics. *Circulation*. 2000;102(14):1651-6.
15. Perkins-Porras L, Whitehead DL, Strike PC, Steptoe A. Pre-hospital delay in patients with acute coronary syndrome: factors associated with patient decision time and home-to-hospital delay. *Eur J Cardiovasc Nurs*. 2009;8(1):26-33.
16. Ledur P, Almeida L, Pellanda LC, Schaam BD. Preditores de infecção no pós-operatório de cirurgia de revascularização miocárdica. *Rev Bras Cir Cardiovasc*. 2011;26(2):190-6.