ORIGINAL ARTICLE

Evaluation of prehospital delayed care of acute myocardial infarction in the Midwest of Minas Gerais, Brazil

Avaliação do retardo pré-hospitalar no cuidado ao infarto agudo do miocárdio no Centro Oeste de Minas Gerais, Brasil

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DOI: 10.5935/2238-3182.20150070

ABSTRACT

Introduction: complications from acute myocardial infarction (IAM) are associated with its rapid evolution and ignorance about its symptoms in the population. **Objective:** to evaluate the time between the onset of symptoms and patient arrival with IAM to the specialized service, and factors associated with time spent in the pre-hospital care. **Method:** this was a prospective cohort study about IAM surveillance in five emergency services. Patients were interviewed during hospitalization with records of proceedings and clinical outcomes. A descriptive and multivariate analysis using the classification and regression tree was carried out. **Results:** 40 patients were diagnosed with IAM and three of them died during hospitalization. There was a delay in seeking care in 37.5% of patients. The arrival at the hospital was earlier in those with IAM and ST-segment elevation (IAMCSST). Age, education, the number of people in the residence, and gender were also associated with this delay. The main treatments were primary angioplasty and fibrinolysis. However, reperfusion therapy was not performed in 62.5% of the patients. Among those receiving fibrinolysis, the port-balloon time was over 90 minutes in 85.7%, and the port-needle time was over 30 minutes in 61.5%. Patient satisfaction with the care received was expressed and professionals were moderately satisfied with the care provided. **Conclusion:** the prehospital delay was higher than advocated in over one-third of patients. Many did not receive adequate reperfusion therapy, an indicator that needs improvement given the evidence of its impact on morbidity and mortality.

Key words: Myocardial Infarction; Emergency Medical Services; Clinical Evolution.

RESUMO

Introdução: *complicações do infarto agudo do miocárdio (IAM) estão associadas à sua evolução rápida e desconhecimento de sua sintomatologia pela população.* **Objetivo:** *avaliar o tempo entre início da sintomatologia e a chegada do paciente com diagnóstico de IAM ao serviço especializado e os fatores associados ao tempo gasto pela atenção pré-hospitalar.* **Método:** *estudo de coorte prospectivo com vigilância do IAM em cinco serviços de emergência. Os pacientes foram entrevistados durante a internação com registro dos procedimentos e evolução clínica. Realizada análise descritiva e multivariada utilizando árvore de classificação e regressão.* **Resultados:** *40 pacientes foram diagnosticados com IAM e três deles foram a óbito durante a internação. Houve atraso na busca de atendimento em 37,5% dos pacientes. A chegada ao hospital é mais precoce naqueles com IAM com supradesnivelamento do segmento ST (IAMCSST). Foram também associados a esse tempo a idade, escolaridade, número de pessoas na residência e sexo. Os principais tratamentos foram angioplastia primária e fibrinólise, porém a terapia de reperfusão não foi realizada para*

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Submitted: 2014/04/05
Approved: 2015/08/18

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62,5% dos pacientes. Entre aqueles que receberam fibrinolíticos, o tempo porta-balão foi de mais de 90 minutos em 85,7% e o tempo porta-agulha acima de 30 minutos em 61,5%. Houve satisfação do paciente com o atendimento recebido e o profissional ficou medianamente satisfeito com o atendimento prestado. **Conclusão:** *o retardo pré-hospitalar foi superior ao preconizado em mais de um terço dos pacientes. Muitos não receberam terapêutica adequada de reperfusão, indicador que precisa ser melhorado tendo em vista as evidências de seu impacto na morbimortalidade.*

Palavras-chave: *Infarto do Miocárdio; Serviços Médicos de Emergência; Evolução Clínica.*

INTRODUCTION

Cardiovascular diseases (DCV) account for the leading cause of death in Brazil and the world and represent the highest cost of hospitalization in the Unified Health System (SUS).[1] The World Health Organization revealed in 2008 that 23.6% of deaths worldwide occurred by DCV while in Brazil they represented 29% in 2007. Among the causes of death and hospitalization due to DCV, acute coronary syndromes (SCA) and especially acute myocardial infarction (IAM) are highlighted.[2]

Almost half of the deaths due to IAM occur at home because much of the population is unaware of the first symptoms and do not timely seek medical help.[3]

Divinópolis is located in the midwestern region of Minas Gerais and is a health hub in the municipality in the western macro-region encompassing 55 cities with a population estimated at 198,304 inhabitants.[4] However, the municipality does not have a care protocol for patients with IAM. In 2011, 12,240 hospital admissions were carried out by SUS in Divinópolis, and DCVs accounted for 14% (1,697) of these hospitalizations in the same year; 4.2% (74/1750) of the deaths were due to IAM. Hospital deaths accounted for 55.0% while those occurring in other health facilities (38.0%) and at home accounted for 12.0%.[5] It is known that mortality due to IAM is reducing and is less than 5 % in developed countries.[6]

The early recognition of heart attack and prompt initiation of treatment are effective interventions required in IAM patients. The reality of the Divinópolis municipality can display a delay in seeking health care for patients. Therefore, the development of a study to investigate the time between the onset of symptoms and arrival of patients with IAM to specialized service as well as factors associated with prehospital delay is plausible.

METHOD

This was an observational epidemiological study of concurrent cohort conducted in four hospitals and one emergency care unit (UPA) in the city of Divinópolis, MG. The city has two public hospital services; one hospital has a special agreement with SUS, one is a UPA, and three are private hospitals. The study was conducted in all municipal emergency services from September to November of 2011, totaling ten weeks of observations. All hospitals had a coronary care unit or emergency room with electrocardiographic monitoring, hemodynamic laboratory, and were able to perform procedures for percutaneous coronary intervention and cardiac surgery.

All patients who were admitted to these services with suspected IAM were eligible for this study. A surveillance system was implemented in the emergency care units. Screening forms were available in the UPA and emergency care hospitals. Eligible patients for the study were identified based on the information collected in this screening form. All patients with IAM were included in the sample; with and without ST-segment elevation; identified in the screening form and later confirmed with information from the responsible doctor and medical records. Patients with unstable angina were excluded. These were followed up from health service admission to hospital discharge. Data were collected through interviews with patients or relatives, medical personnel, and medical record information.

Five instruments were used in this investigation:

- screening form;
- supplementary information form with medical record data;
- interview protocol with the patient and/or family member;
- CARDIOSATIS scale – Team;
- CARDIOSATIS scale – User.

Data were collected by medical school students previously trained and supervised by professors from the Federal University of São João del Rei. Interviews with patients were performed during the hospital stay and after clinical stability. In the event of death or disability, the information was collected

in an interview with a family member or by legally authorized patient representatives.

All data collection instruments were tested in the pre-test and pilot study. The data collection protocol in the medical records included information about procedures performed, medications administered, incoming diagnosis, admission sector, and length of stay. The interview with patients included socioeconomic, demographic, lifestyle, comorbidities, and cardiovascular risk factors information, and the use of health services and satisfaction with the care received.

The satisfaction with the service provided or received was assessed through the CARDIOSATIS scales for User and Team, which are instruments validated for Brazil and present good validity and reliability characteristics. These are instruments that assess satisfaction on a five-point scale where values 4 and 5 indicate great satisfaction, 3 reveals that the professional or patient is moderately satisfied, and 1 and 2 reflect dissatisfaction with the evaluated item.[7] The evaluation of medical staff satisfaction with the structure for assistance to DCVs in the city was conducted by professionals responsible for the IAM cases identified in the study. In this case, the CARDIOSATIS scale -Team was self-applied.

Descriptive statistics with frequency and percentage distribution were performed with measurements of central tendency and dispersion. The multivariate analysis using a decision tree based on the Classification and Regression Tree algorithm (CART) was used to evaluate the association between the onset of symptoms and first visit to the health service. This method consists of successive divisions in the data set in order to make it increasingly more homogeneous regarding the response variable.[8,9]

Two models were built, one associating the time of onset of symptoms and arrival at the health service (pre-hospital delay) with the socioeconomic and demographic characteristics, and one with the time when procedures were performed and types of procedures stratified by diagnosis. The response variable was categorized as time < 2 hours and time > 2 hours. The explanatory variables were also categorized and treated dichotomously. The Gini index of 0.01 was the main stopping criteria adopted for the CART. The fit of the final model was evaluated using statistical risk that compares the difference between the results expected and observed by the model, indicating in which measurements the tree correctly predicts the results. The data were entered into EpiData and analyzed using SPSS 19.0.

This research complied with the Resolution 196/96, which regulates research involving human beings. The project was approved by the Research Ethics Committee of the São João de Deus Hospital under Opinion number 25/2011.

RESULTS

Characteristics of patients on admission

A total of 45 patients were eligible for the study, however, the diagnosis of IAM was later dropped in five of them. Out of the 40 patients identified, three (7.5%) died during the investigation. The admission information is presented in Table 1.

Table 1 - Clinical characteristics of patients with suspected IAM at admission (n = 40). Divinópolis, September to October of 2011

Characteristics of patients at screening	n	%
Service where the first intervention was conducted		
Municipal emergency unit	13	32.5
Hospital A	11	27.5
Hospital B	8	20.0
Hospital C	5	12.5
Hospital D	3	7.5
Symptoms		
Chest pain with classic manifestation	25	62.5
Occurrence of sweating, nausea, vomiting, or syncope	11	27.5
Chest pain without irradiation	10	25.0
Chest pain with atypical manifestation	4	10.0
Time in hours between the onset of symptoms and the first assistance		
0 to 2:00	23	57.5
2:01 to 24:00	10	25.0
> 24:00	7	17.5
Transportation used to the emergency room or hospital		
Own vehicle	15	37.5
Ambulance	12	30.0
Someone else's vehicle	8	20.0
Bus or Taxi	5	12.5
Distance in kilometers between the site when onset of symptoms occurred and the emergency service		
Up to 50 Km	28	70.0
More than 50 Km	12	30.0

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Table 1 - Clinical characteristics of patients with suspected IAM at admission (n = 40). Divinópolis, September to October of 2011

Characteristics of patients at screening	n	%
Exams conducted at the patient's arrival at the Emergence Unit		
Electrocardiogram	40	100.0
CK/Total CKMB	38	95.0
Troponin	29	72.5
Chest X-ray	13	32.5
Initial admission sector		
ICU/ICC	27	67.5
Room/Sick bay	5	12.5
Semi-Intensive Unit	5	12.5
Others	3	7.5

Out of the 40 patients, 32.5% were first assisted in the UPA municipal service, followed by the hospital with the special agreement with SUS with 27.5% (Unit A) and private hospitals with 20% (Unit B). Regarding the clinical presentation, patients arrived conscious (92.5%) and wandering (52.5%) and the main clinical symptom reported was chest pain with classic irradiation (62.5%). Considering the time between the onset of symptoms and the first assistance provided by experienced personnel, 42.5% of patients were admitted in services with this time above two hours. The main means of transport was own vehicle or from a friend; residence with a distance greater than 50 kilometers from the emergency service was reported by 30% of patients. The electrocardiogram and Total CK/CKMB were exams performed on admission; the principal place of hospitalization was the intensive or coronary care unit (67%).

Sociodemographic data, comorbidities, and cardiovascular risk factors

Out of the 37 surviving patients, 62.2% were men at the mean age of 59 years and BMI of 26 kg/m². Most had completed elementary school (49%), were married (75.7%), lived in urban areas (89.2%), with an average of 3.9 persons per household, and had a family income between two and four minimum wages. The main financier was SUS (54.1%). Most patients spent less than two hours between the onset of symptoms and arrival at the first emergency service (62.2%). Upon arrival, 83.8% of them were seen in less than 20 minutes of waiting. The main comorbidities reported were hypertension (70%), diabetes (30%), and dyslipidemia (58.5%). The family history of ischemic heart disease was described by 32.4% of patients, stroke by 19%, and previous history of infarction by 13.5%. Sedentary lifestyle was identified in 81%, current or recent smoking in 68%, habitual use of alcohol in 21.6%, and everyday stress in 62%. In assessing their health at 15 days before the heart attack, patients reported it as fair or poor (37.8%), good (45.9%), and very good (16.2%) (Table 2).

Table 2 - Sociodemographic characteristics, comorbidities, and risk factors in patients with IAM (n = 37). Divinópolis, September to October of 2011

Sociodemographic characteristics	n	%
Gender		
Male	23	62.2
Female	14	37.8
Age (average and standard deviation)	59.0 (9.3)	
BMI (average and standard deviation)	26.0 (8.7)	
Number of persons in the household (average and standard deviation)	3.9 (3.0)	
Education		
Incomplete Middle School	18	48.6
Completed Middle School	10	27.0
High School	5	13.5
Others[1]	4	10.8
Marital Status		
Married	28	75.7
Widower	6	16.2
Single	3	8.1
Place of residence		
Urban	33	89.2
Rural	4	10.8
Family income		
Up to 2 minimum wages	13	35.1
2 to 10 minimum wages	23	62.2
> 10 minimum wages	1	2.7
Finance suport for hospital assistance		
SUS	20	54.1
Supplementary assistance	17	45.9
Waiting time for assistance		
Up to 20 minutes	31	83.8
> 20 minutes	6	

(1) Others including illiterate (3) and college level (1).

Procedures performed and clinical outcomes of IAM patients

Information on the conducted procedures and examinations, used medications, data on the clinical evolution of the patient to the outcome in each institution (discharge/transfer/death) are presented in Table 3.

Table 3 - Procedures performed and clinical evolution of patients with IAM (n = 40). Divinópolis, September to October 2011

Variables	n	%
Procedures performed during assistance		
Fibrinolytic agents (streptokinase or tenecteplase and alteplase)	15	37.5
Primary angioplasty	7	17.5
Rescue angioplasty	5	12.5
Exams performed		
Electrocardiogram	40	100
CK/Total CKMB[1]	38	95.0
Troponin	28	70.0
Echocardiogram without stress	4	10.0
Door-to-needle time		
Up to 30 minutes	5	38.5
Over 30 minutes	8	61.5
Door-to-balloon time	7	
Up to 90 minutes	1	14.3
Over 90 minutes	6	85.7
Stay in the coronary unit or ICU[2]		
1 – 3 days	21	58.3
4 – 5 days	10	27.8
More than 6 days	5	13.9
Hospital stay		
< 7 days	19	57.5
> 7 days	14	42.5
Diagnosis		
Confirmed IAM3 with supra-ST[4]	24	60.0
Confirmed IAM3 without supra-ST	16	40.0
Patient's exit		
Discharged	25	71.4
Transferred	7	20.0
Death	3	8.6

(1) CK-MB: MB fraction of creatine phosphokinase; (2) IAM: acute myocardial infarction; (3) ICU: Intensive Care Unit; (4) Supra-ST: ST-segment elevation.

Considering the procedures performed, fibrinolytic therapy was performed in 15 patients (37.5%). However, five of them required rescue (33.3%). A total of seven patients (17.5%) were initially submitted to primary angioplasty. Out of the 15 patients who received fibrinolytic therapy, 61.5% had it after 30 minutes from hospital arrival (door-to-needle time). However, among those who underwent primary angioplasty, the procedure was performed with less than 90 minutes from arrival at the emergency room (door-to-balloon time) in one patient; the remaining patients (85.7%) showed longer than 90 minutes time. The time in the coronary care unit was between one and three days in 58% of patients; the total hospital stay was less than seven days in 57%. The IAMCSST diagnosis was recorded in the medical chart of 24 patients (60.0%). During the study, seven patients (20.0%) were transferred to specialized services in other cities, and 25 patients (71.4%) had all procedures performed in health services in Divinópolis with hospital discharge records.

Characteristics of patients who died

Three IAM patients evolved to death, reaching a mortality rate of 7.5%. Two patients were admitted as suspected IAM cases and showed time less than two hours between the onset of symptoms and first assistance. Only one patient arrived at the service as a confirmed case, however, with time greater than 24 hours from the onset of symptoms. These three patients underwent ECG and Total CK/CKMB on admission. Two of these patients received fibrinolytic therapy. The door-to-needle time in one of them was 60 to 120 minutes and above 120 minutes in the other. Conversely, one patient underwent rescue angioplasty, with door-to-balloon time over 120 minutes. One was an IAM carrier without supra-ST (IAMSST) and two with IAMCSST. All were admitted to the intensive care unit, two died within the first 24 hours, and the other remained in this unit for seven days.

All of them were treated with aspirin, clopidogrel, oxygen therapy, and beta-blockers. Furthermore, two of them received statins and one received nitrate. All patients underwent catheterization and echocardiography. The three patients who died were outside of Divinópolis at the onset of symptoms, at distances of 154 km, 80 km, and 46 km from the emergency service.

Satisfaction with the care provided or received

A total of 12 physicians responded to the satisfaction scale of CARDIOSATIS – Team. Professional satisfaction is shown for the two domains and global scale (Figure 1). In the first domain, the satisfaction with care provided showed a mean score of 3.04 (SD: 0.63); the second domain deals with the service structure and was 3.69 (SD: 1.0). The average overall satisfaction for the CARDIOSATIS-Team scale was 3.53 (SD: 0.60). The lowest scores were given to two items: "satisfaction with the care provided" and "structure to conduct DCV in the city", both with a score of 3.0.

The result of patient satisfaction with the care received in the service is shown in Figure 1. The best evaluation was in the possibility of future use of the service with an average of 4.9 (SD = 0.30), followed by satisfaction with the ability of diagnosis and management of disease with 4.6 (SD: 0.31), and satisfaction with care received and waiting time as 4.6 (SD: 0.49). The item that received the lowest score was "information received about the disease," with an average of 3.8 (SD = 1.40) indicating regular satisfaction. The overall patient satisfaction with the care received in the emergency units was 4.6 (SD = 0.25) indicating satisfaction with the care received for DCVs in the city.

Multivariate data analysis

Figure 2 shows the result of the association between the onset of symptoms and arrival at the emergency service and socioeconomic and demographic factors. The group of patients was discriminated by age; the group aged < 60 years and with fewer than three people in the household arrived with time < 2 hours to the service (100%). The group aged < 60 years, with more than three people in the household, and female gender arrived with the time < 2 hours (80%) compared to the male gender (50%). The group of patients older than 60 years and education of > 4 years also arrived sooner at the service (80%).

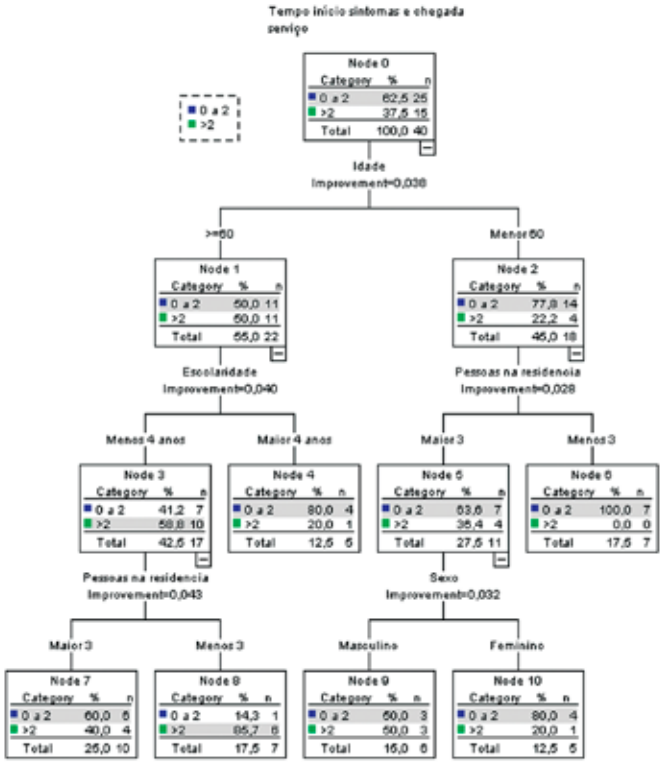

Figure 1 - Multivariate analysis through the decision tree (CHAID) associating the time of onset of symptoms and first assistance by a specialized service with socioeconomic and demographic variables (n = 37).

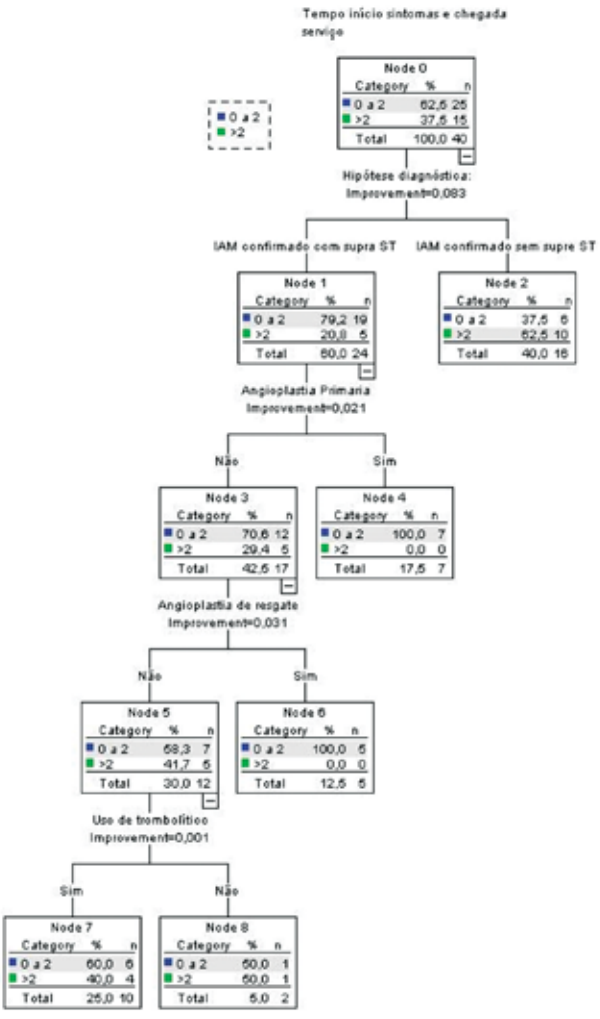

Figure 2 - Multivariate analysis through the decision tree (CHAID) associating the time of onset of symptoms and first assistance by a specialized service with socioeconomic and demographic variables (n = 37).

In the other tree ramification, patients aged > 60 years, little education, and fewer people in the household arrived later in the service (85.6%) compared to those with more than three people in the household showing that 60.0% arrived with time < 2 hours (Figure 2).

The result of the multivariate analysis for the association between time of procedures and diagnosis is shown in Figure 2. The analysis of the applied therapies showed that all IAM patients with supra-ST who underwent only primary angioplasty or rescue angioplasty showed time between the onset of symptoms and first assistance of fewer than two hours (100%). However, there was a high percentage of patients (40.0%) who were slow to seek medical attention among those who only used thrombolytics (Figure 2).

DISCUSSION

This study has identified delays in seeking care for IAM treatment in 37.5% of the evaluated patients. Patients who arrived earlier at the service were those with IAMCSST. In relation to the sociodemographic variables, age younger than 60, high level of education, and more than three people in the household were important markers for an early search for medical care services. Younger patients living with fewer

people in the household arrived earlier. For those at the same age and with more people in the household, being female favored the early search. Another important point was the high level of patient satisfaction with the care received in Divinópolis health services (Figures 3 and 4).

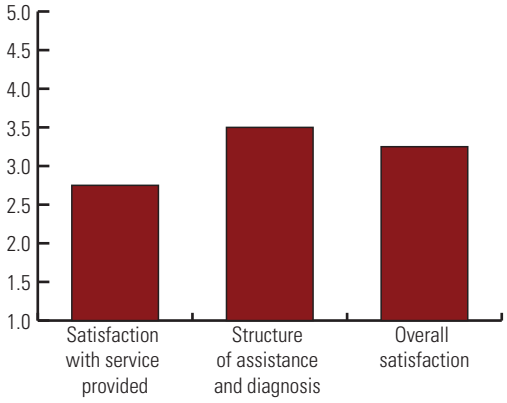

Figure 3 - Satisfaction of users with the structure of assistance and care to cardiovascular diseases in the emergency units in Divinópolis, MG (n=37).

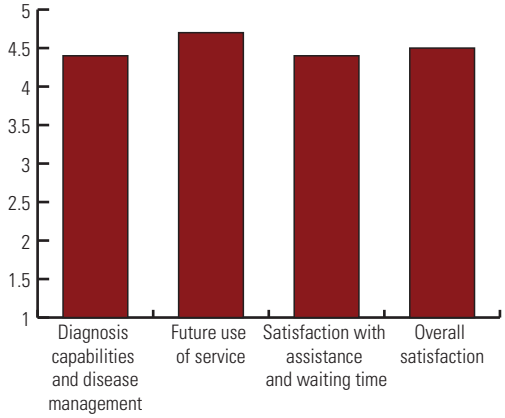

Figure 4 - Satisfaction of medical team with the structure of assistance and care to cardiovascular diseases in the emergency units in Divinópolis, MG (n=12).

Regarding the profile of patients with favorable time (less than two hours), it was observed that the sample consisted primarily of individuals younger than 60 years, little education, and living with more than three people in the household. This finding is consistent with the Directive from SBC in 2009, which classifies elderly patients with low socioeconomic status as the most vulnerable to factors that influence the delayed search for care due to IAM.

The standard IAM patient in this investigation are men (62.2%), at the average age of 59 years, low education (incomplete middle school education – 48.6%), and married (75.7%), which is in agreement with a study conducted in a teaching hospital of São José do Rio Preto.[10] In our sample, 25 patients (68%) had a history of smoking, 70% were hypertensive, 30% reported being in diabetic treatment, and the average BMI was 26 kg/m². In a similar survey conducted in the city of Uberlândia, Minas Gerais, 71% were smokers, 69% were hypertensive, 29% diabetics and 71% were males, revealing a similar reality between the region of Triângulo mineiro and the Midwestern region of Minas Gerais.[11] Conversely, a study conducted in Greece indicated that these comorbidities were also present, however, with a lower incidence of risk factors such as smoking (35.3%), hypertension (52.0%), and diabetes (30.0%).[12] Each of these risk factors represents, individually and especially combined, potential risk for ischemic events.[12-14] The first IAM episode was found in 32 (86.5%) patients, which is close to the percentage (83.5%) found in a descriptive study conducted in a public hospital in Salvador. This study also showed that most of these patients used their own vehicle as well as in Divinópolis (82.4%) although this percentage was more significant (97%) in that study.[15]

This study identified classic risk factors associated with DCVs and its main comorbidities.[15] In addition, the time of fewer than two hours to start treatment, applicable to most patients, was consistent with the recommendations in the main Cardiology treaties.[1,14] Thus, it is assumed that these patients could undergo a more effective therapy, reducing the considerable mortality rate due to IAM (7.5%) observed in this period in Divinópolis. However, distortions about the latest guideline of the Brazilian Society of Cardiology (SBC) on the Treatment of IAM were revealed. Procedures, exams, and medications such as AAS, beta-blockers, clopidogrel, and anticoagulants that have well-established impact according to the SBC guidelines, were not used in many cases.[16] Only 17.5% of patients underwent primary angioplasty; a significant number of these patients (85.7%) had a door-to-balloon time greater than 90 minutes, which suggests poor prognosis. Work conducted in a private cardiology reference hospital in Rio de Janeiro obtained more satisfactory results such as the primary angioplasty rate of over 97%, and door-to-balloon time of fewer than 90 minutes in 78.3% of cases.[17]

In this study, 45% of patients did not receive appropriate reperfusion therapy (angioplasty or thromboly-

sis), an information consistent with other studies that show a real-world distancing from the scientific evidence of the effectiveness of fibrinolytics, [6,17] because 1/3 of patients with indication for its use did not receive it, independent findings on geographic location.

The in-hospital mortality observed in this study was 7.5%, a higher number than that found by a recent study conducted with information from the SCA Brazilian registry during a period of six years, which was 5.53%[18] and 4.7 % found in patients admitted with SCA in a specialized national hospital.[19] However, data from this study were lower than those of the study conducted in the municipality of Rio de Janeiro, which recorded an overall mortality of 9.0%.[20]

The fact that all patients who died resided outside of Divinópolis draws attention; this distance may have contributed to the delay in receiving the first specialized care for IAM. The absence of coronary care units in other municipalities in the macro-region as well as the absence of a specialized transport system, such as the SAMU, may have contributed to this unfavorable outcome. A study conducted in the Brazilian reality reveals more in-hospital mortality in cases of IAMSSST with delayed intervention.[21]

The satisfaction of users and doctors about the structure to care for DCV reached an accentuated average resulting from timely procedures, although doctors have a more critical view in relation to the structure of services for assisting IAM patients. This could be reflected in their lower scores of satisfaction when compared to those from users (3.5 versus 4.6).

One limitation of this study was the small number of patients evaluated, which made it impossible to conduct a more robust statistical analysis and difficult to compare results with other studies within the IAM theme. The exclusion of the unstable angina diagnosis contributed to the limited number of patients considering that other authors have shown that this diagnosis accounts for 42% of hospitalizations related to SCA in Brasil.[18] The absence of follow-up interviews with family members or proxy individuals of the deceased patients is another limitation in this study. Further contact was difficult, although the team has tried contacting, at least, three times because these patients resided outside the municipality of Divinópolis. The absence of this information may have hampered the accuracy of the data initially collected about time at the screening time.

Although with some limitations, this study provides important indicators of the time delayed between the onset of IAM symptoms and care provided in emergency rooms, as well as the characteristics that favor the search for care in a timely manner. Patients included in this study are from different municipalities in the health assistance macro-region, which contributes to the representability of the investigated event.

Finally, it is known that the issue of medical attention delay is not connected to the patient, who does not always recognize or accept the severity of his condition, but also to the wide range of social determinants in the health and disease process such as individual and socioeconomic characteristics, factors such as availability and access to hospital networks, or absence of physical infrastructure and adequate human resources. Considering all these aspects, a number of actions that promote the care of these patients are imperative in order to decrease pre-hospital delays and promote appropriate conduct in the treatment of IAM.

CONCLUSION

Time is arguably the greatest determinant of the prognosis of patients with IAM. Both the time between the onset of symptoms and that of the first assistance, and the elapsed time from the admission time directly influence the type of treatment employed and therefore, the clinical outcome. In Divinópolis, with respect to the initial IAM treatment, 45% of patients did not receive adequate therapy of reperfusion (angioplasty or thrombolysis); indicators that need to be improved. It is necessary to restructure the assistance network to standardize the implementation of these interventions in the city. On many occasions, patients enter the health service in a timely manner but do not receive primary angioplasty, even showing clinical indications for this procedure. In addition, the creation of an mobile emergency service in Divinópolis is essential to optimize the initial assistance time.

REFERENCES

1. Mansur AP, Favarato D, Avakian SD, Ramires JA. Trends in ischemic heart disease and stroke death ratios in Brazilian women and men. Clinics. 2010; 65(11):1143-7.
2. Junqueira-Lodi L, Ribeiro AL, Mafra AA. Protocolo Clínico sobre Síndrome Coronariana Aguda. Belo Horizonte: Secretaria de Estado da Saúde de Minas Gerais; 2011. p.1-49.

3. American Heart Association. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction- Executive Summary. Circulation. 2004; 110(9):e82-292.
4. Divinópolis. Secretaria Municipal de Saúde. Plano Municipal de Saúde: 2009-2012. Divinópolis: SMS; 2009.
5. Brasil. Ministério da Saúde. Informações de saúde. Indicadores e dados básicos. IDD 2011. Brasília: Ministério da Saúde; 2011.
6. III Diretriz da Sociedade Brasileira de Cardiologia sobre tratamento do infarto agudo do miocárdio. Arq Bras Cardiol. 2004; 83(4):1-86.
7. Oliveira GL. Escalas CARDIOSATIS: satisfação de médicos e usuários de serviços de saúde com o atendimento às doenças cardiovasculares utilizando recursos de telessaúde projeto minas telecardio [dissertação]. Belo Horizonte: Universidade Federal de Minas Gerais; 2011.
8. Breiman LJ, Friedman RA, Stone CJ. Classification and regression trees. Belmont: Chapman and Hall; 1984.
9. Cardoso CS, Caiaffa WT, Bandeira M, Siqueira AL, Abreu MNS, Fonseca JOP. Qualidade de vida e dimensão ocupacional na esquizofrenia: uma comparação por sexo. Cad Saúde Pública. 2006; 22(6):1303-14.
10. Bastos AS, Beccaria LM, Contrin LM, Cesarino CB. Tempo de chegada do paciente com infarto agudo do miocárdio em unidade de emergência. Rev Bras Cir Cardiovasc. 2012; 27(3):411-8.
11. Coelho LM, Resende ES. Perfil dos pacientes com infarto do miocárdio em um hospital universitário. Rev Med Minas Gerais. 2010; 20(3):323-8.
12. Eagle, KA, Goodman, SG, Avezum A, Budaj A, Sullivan CM, López-Sendón J, et al. Practice variation and missed opportunities for reperfusion in ST-segmentelevation myocardial infarction: findings from the Global Registry of Acute Coronary Events (GRACE). Lancet. 2002; 359(9304):373-7.
13. Muller LA, Rabelo ER, Moraes MA, Azzolin K. Delay factors on the administration of thrombolytic therapy in patients diagnosed with acute myocardial infarction in a general hospital. Rev Latino-Am Enferm. 2008; 16(1):52-6.
14. Piegas LS, Feitosa G, Mattos LA, Nicolau JC, Rossi Neto JM. Sociedade Brasileira de Cardiologia. 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.
15. Mussi FC, Passos LC, Menezes AA, Caramelli B. Entraves no acesso à atenção médica: vivências de pessoas com infarto agudo do miocárdio. Rev Assoc Med Bras. 2007; 53(3):234-23.
16. Sant'Anna FM, Alvarez FS, Bruno RV, Brito MB, Menezes S, Correa FWB, et al. Desfechos hospitalares em pacientes submetidos à intervenção coronária percutânea na vigência de síndromes coronárias agudas atendidos em Unidades de Pronto Atendimento (UPAs): resultados de um Centro de Cardiologia Terciário. Rev Bras Cardiol Invas. 2010; 18(1):30-6.
17. Rocha AS, Araújo MP, Carvalho LAF, Ribeiro A, Mesquita ET. Evidência de Melhora na Qualidade do Cuidado Assistencial no Infarto Agudo do Miocárdio. Arq Bras Cardiol. 2010; 94(6):726-9.
18. Piegas LS, Avezum A, Guimarães HP, Muniz AJ, Reis HJL, Santos ES, Knobel M, Souza R. Comportamento da Síndrome Coronariana Aguda. Resultados de um Registro Brasileiro. Arq Bras Cardiol. 2013; 100(6):502-10.
19. 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.
20. Reis AF, Salis LH, Macrini JL, Dias AM, Chilinque MG, Saud CG, et al. Síndrome coronariana aguda: morbimortalidade e prática clínica em pacientes do município de Niterói (RJ). Rev SOCERJ. 2007; 20(5):360-71.
21. Campos CAHM, Lemos PA, Ribeiro EE, Falcão JLAA, Perin MA, Kajita LJ, et al. Síndrome coronária aguda sem supradesnível de ST de alto risco: a mortalidade intra-hospitalar é proporcional ao retardo para a intervenção. Rev Bras Cardiol Invas. 2007; 15(3):244-8.