International
Journal of
**Health
Science**

PRE-HOSPITAL CARE FOR PEOPLE WITH ACUTE CORONARY SYNDROME IN THE CENTRAL COASTAL REGION

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Abstract: Introduction and objectives: Globally, 12% of disability-adjusted years of life lost annually are attributable to ischemic coronary disease. Acute Coronary Syndrome (ACS) is an acute myocardial infarction (AMI) or ischemia with approximately three-quarters representing ACS without ST elevation. The aim is to describe the care time for people with SCA in the central coastal region of Portugal.

Methods: Retrospective study, approved by the competent ethics committees. Thus, the convenience sample consisted of 188 individuals treated for chest pain with an average age of 67.53±14.71 years, 53.7% male, of which 26 were treated for ACS.

Results: It appears that there are no significant differences between the average time from activation to arrival at the ED with the days of the week, the shift and the municipality and type of ADE. Furthermore, it appears that there is a significant longer time in the average time from activation to arrival at the place of occurrence for distances equal to or greater than 10Km.

Conclusions: There are no significant differences between the average times depending on the day of the week, municipality and type of EAM. There was a significantly lower average between the average time from activation to arrival at the place of occurrence.

Keywords: Acute coronary syndrome; Critical care; Emergency Medical Services

INTRODUCTION

With an estimated 8 to 10 million individuals, chest pain represents the second most common chief complaint presenting annually to emergency departments (EDs) in the United States[1]. SCA affects approximately 1 million individuals in the United States annually, with approximately three-quarters representing non-ST elevation SCA. Approximately $8 billion is spent annually on managing individuals with suspected SCA in the United States[1].

ACS is an acute myocardial infarction (AMI) or ischemia, usually due to altered coronary blood flow. Individuals typically present with chest pain or pressure, but sometimes they present with atypical symptoms. Assessment begins with an electrocardiogram (ECG) obtained within 10 minutes of presentation. If ST segment elevation is present, ST segment elevation (STEMI) is diagnosed. However, many individuals with ACS are misdiagnosed, with between 2% and 5% of individuals being inappropriately discharged from the ED[2].

Although substantial progress has been made in the diagnosis and treatment of acute coronary syndromes, cardiovascular disease remains the leading cause of death worldwide, with nearly half of these deaths due to ischemic coronary disease[3]. Globally, 12% of disability-adjusted years of life lost annually are attributable to ischemic coronary heart disease[4,5].

A *American Heart Association* states that the best option in the event of a suspected ACS event is to activate emergency medical services[6]. This recommendation is based on the fact that this could provide safer transport and shorter time intervals for treatment. However, a substantial proportion of patients seek medical care directly when experiencing acute chest pain[7].

ACS is the most time-sensitive acute cardiac event that requires rapid referral and response. The priority medical referral system (``Centro de Orientação de Donte Urgente`` - CODU), one of the most widely used types of emergency referral systems (in Portugal), is a hypothesis for providing better quality pre-hospital emergency treatment. However, few studies have revealed the impact of using this type of service in the ACS treatment process[8].

Therefore, it is imperative to study the

care times of people suffering from ACS as inadequate pre-hospital emergency medical services and the lack of coordination between facilities contribute to the worse clinical outcomes observed. Furthermore, management guidelines for ST-segment elevation MI (STEMCS) focus on avoiding delays in treatment and achieving reperfusion therapy as early as possible. The best clinical outcomes for an EAMcsST occur when the time from first medical contact to diagnosis is within 10 minutes of arrival at a hospital equipped for reperfusion therapy (e.g. Percutaneous Coronary Intervention) [9,10].

Therefore, the following research question was outlined: "What is the care time in the pre-hospital period for people with ACS in the Figueira da Foz region?", with the aim of this investigation, therefore, to describe the care time for person with SCA in the central coastal region of Portugal.

MATERIALS AND METHODS

In response to the study objectives, a retrospective study was developed. Thus, information was collected on sex (categorical), age (Ordinal), shift (categorical) and day of the week (categorical) of activation of the occurrence, diagnosis, type of ACS (categorical), time from the start of treatment until the arrival at the Emergency Department (continuous) and time from activation to arrival at the Emergency Department (continuous) and personal history (categorical). In this follow-up, data were collected from records carried out between November 2017 and December 2018. Thus, the sample consisted of 188 individuals treated for SCA with an average age of 67.53±14.71 years, 53.7% male.

A request was made to the president of the Ethics Committee of a hospital in the central region to consult the VMER database and the clinical files of patients transferred with ACS. A request was also made to the Ethics Committee of the National Institute of Medical Emergency (INEM) for authorization to consult the files of the Urgent Patient Guidance Center (CODU) and the Emergency and Resuscitation Medical Vehicle (VMER) database of a hospital in the central region during the period under analysis and a request to the president of the Ethics Committee of the Hospital Center to where some patients who were part of the sample were transferred, to consult their clinical files. A favorable opinion was obtained for all requests to carry out the study.

For data analysis, the statistical software IBM SPSS Statistics, version 26, was used. For quantitative variables, means and standard deviations were calculated. For quantitative variables, absolute (n) and relative frequencies (%) were calculated. To meet the objectives, the Analysis of Variance (ANOVA) statistical test was used. For all data analysis, a significance level of 0.05 was used.

RESULTS

Regarding the activation of the Urgent Patient Guidance Center (CODU) to assist people with chest pain, this happened most frequently in the morning (50.5%), followed by the afternoon (34.0%) and night (15.4%). As for the day of the week, Thursday was the day with the highest frequency of assistance (17.0%). In turn, the day with the lowest frequency of assists was Saturday (12.2%). For the remaining days of the week, the frequency of assistance varied between 13.3% and 14.9%.

Regarding the diagnosis of the person assisted by chest pain, chest pain (26.1%) is the most frequent, followed by anxiety (10.1%) and STEMI (8.5%).

In this follow-up, of the activations due to chest pain, 73.1% were male, had a mean age of 67.81±10.63 years and 13.8% were due to ACS, of which 61.6% were diagnosed with EAMssST.

Regarding the 26 individuals diagnosed with ACS and after checking the assumptions of the t-test for independent samples (normal distribution and homogeneity of variances), it was possible to verify that there are no significant differences: i) in the average time from activation to upon arrival at the ED with the days of the week (Weekend: 70.83±20.56; Weekdays:

68.65±16.99; t (24)=0.794; p=0.794). Furthermore, through an analysis of variance (ANOVA) it was observed that there are no significant differences between the total time between activation and arrival of the ED with the shift in which the activation occurred (p=0.317).

Regarding the average times from activation to arrival at the emergency room, there were no significant differences between municipalities (p=0.484). In figure 1 you can see the distribution of average times where it can be seen that the municipality of Figueira da Foz has the shortest time from activation to arrival at the ED (52.27±17.54).

Of the individuals diagnosed with ACS, high blood pressure is the most common antecedent (46.2%), followed by dyslipidemia (42.3%).

Considering the 26 individuals assisted by SCA, there are no significant differences between the type of ADE with the average assistance times: time from activation to arrival (p=0.853); time from arrival to start of treatment (p=0.414); time from the start of treatment to arrival at the ED (p=0.545) and time from arrival at VMER to arrival at the ED (p=0.627).

Observing table 1, it appears that there is a significant longer time in the average time from activation to arrival at the place of occurrence for distances equal to or greater than 10Km (12.5 vs. 8.6, p=0.002).

DISCUSSION

Of the main results observed regarding individuals with SCA, no significant differences were observed between the average time from activation to arrival at the ED with the days of the week, shift and activation advice. Furthermore, no differences were observed between the average times from: i) activation to arrival; ii) arrival at the start of treatment; iii) the beginning of treatment until arrival at the ED; iv) arrival of VMER until arrival at the ED and v) total time between activation and arrival at the ED with the type of EAM.

In this regard, it was observed that occurrences less than 10 km away have an average time from activation to arrival at the place of occurrence that is significantly shorter when compared to occurrences more than 10 km away. For the remaining times studied, there were no differences. significant, that is, the distance is not statistically different for; i) arrival at the start of treatment; ii) the beginning of treatment until arrival at the ED; iii) arrival of VMER until arrival at the ED and iv) total time between activation and arrival at the ED with the type of EAM.

However, a retrospective cohort study observed significant differences between the activation of the medical emergency whether it was a weekday or a weekend and a shift [11]. Regarding the days of the week, identical results (no significant differences were observed) were observed in a retrospective study [12].

The time between the occurrence of symptoms and arrival at the hospital, that is, the delay in receiving effective treatment, is often conceptualized as having two main phases: pre-hospital delay and hospital delay. Pre-hospital delay can be further divided into patient-related delay (also called treatment-seeking delay) and system delays related to the emergence of medical systems. This fact may explain what was observed in the present

Distance		Average	Standard deviation	p-value
Time from activation to arrival at the scene	Less than 10 km	8,6190	3,23228	0,002
	Greater than or equal to 10 km	15,2000	5,80517	
Time from arrival to start of treatment	Less than 10 km	2,0476	1,24403	0,936
	Greater than or equal to 10 km	2,0000	0,70711	
Time from start of treatment to arrival at the ED	Less than 10 km	46,7619	9,57551	0,877
	Greater than or equal to 10 km	46,0000	10,97725	
Time from activation to arrival at the ED	Less than 10 km	65,8095	16,49127	0,106
	Greater than or equal to 10 km	79,2000	13,47961	
Time from arrival at VMER to arrival at the ED	Less than 10 km	48,9524	8,72053	0,835
	Greater than or equal to 10 km	48,0000	10,67708	
Total time between activation and arrival at the ED	Less than 10 km	66,7619	17,70284	0,156
	Greater than or equal to 10 km	79,2000	13,47961	

Table 1 Average distribution of assistance times by the distance where the assistance occurred

study regarding the significantly shorter time from activation to arrival at the place of occurrence for occurrences less than 10 km away from the place of occurrence.

This fact supports the importance that users with SCA, before entering the healthcare system, must quickly recognize their symptoms, and seek transportation and treatment to receive the maximum benefit from treatment. Consequently, many researchers have focused on the delay in seeking treatment (which occurs in the pre-hospital phase). These studies quantified delay and its effects on morbidity and mortality, identified contributory factors, and evaluated interventions to reduce delay. Despite these efforts, little progress has been made in reducing delays in seeking treatment, and this remains a significant obstacle to timely initiation of reperfusion therapies [13,14].

The main limitations of the study include the geographic restriction of the sample (only the geographic area of a hospital in the central region) and the size of the sample of individuals who were treated for ACS, which makes it impossible to extrapolate to the population of study.

CONCLUSION

The present work demonstrated that one of the implications for practice is the fact that there are no statistically significant differences between the average times with the days of the week, with the municipalities and with the type of SCA, supporting compliance with the times established by the international *guidelines* (maximum 120 minutes for fibrinolysis, for example) [15,16]. However, there was a significantly lower average between the average time from activation to arrival at the place of occurrence.

Future work may focus on studying the impact of ACS on health systems and studying the average time from the onset of symptoms to the activation of the pre-hospital emergency service.

Regarding the activation of the Urgent Patient Guidance Center (CODU) to assist people with chest pain, the emphasis lies on the morning shift, with Thursday being the day with the highest frequency of assistance.

On the other hand, the diagnosis of chest pain and thoracic pain predominates.

Activations due to chest pain prevail in males, with a mean age of 67.81±10.63 years.

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