

ORIGINAL ARTICLE

# The Performance of Emergency Medicine Services for Patients with Suspected Acute Coronary Syndrome, Arak, Iran

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**Keywords:** Emergency Medical Services, Emergency Care, Heart Disease, Pre-Hospital

## ABSTRACT

**Introduction:** Due to the lack of adequate and comprehensive data on the Emergency Medicine Services [EMS] performance in dealing with heart disease in Arak, we aimed to investigate the EMS performance to find its defects.

**Methods:** In this retrospective cross-sectional study, the patients referred to Amir-Kabir and Amira-al-Momenin hospitals by the EMS from Mar 2011 to Jun 2012, suspected to heart problems based on their primary chief complaints were enrolled into the study. The age, sex, the time to announce the center for the mission, the time to move the ambulance, the time to arrive the scene [response time], the time to

arrive the hospital (transport time), vital signs and the interventions by EMS personnel were recorded.

**Results:** The average interval time from receiving the mission to move the ambulance was 58 sec, to arrival the scene (beside the patient) was 5.99 min, to stay at the scene was 13.4 min, and to arrival, the hospital was 11.43 min.

**Conclusion:** The time spent on the scene and the interventions are not favorable compared with other studies and need improvement. In this regard, in order to improve the EMS, systematic qualitative studies, equipment improvement, improving the quality of the educational curriculum and treatment protocols are recommended. *JOURNAL OF IRANIAN CLINICAL RESEARCH* 2016;2(1):153-157

## INTRODUCTION

Accurate early intervention is the most important way to reduce morbidity and mortality due providing emergency care particularly in the acute cardiovascular events [1, 2]. Emergency care should be considered as an independent complete system including pre-hospital care, transportation and hospital care. The Emergency Medical Services (EMS) is a fundamental part in emergency treatment, so The EMS system should be simple, consistent and effective [3]. Studying civilian helicopter plans in America shows that the transportation speed is not the primary factor to reduce the emergency patients' mortality, but the main factor is care management by the helicopter staff or the outlying hospital [4].

Therefore, EMS efficiency is dependent to various factors such as the ability of the

personnel, equipment, coordination, and communication system [5].

The Ministry of Health is responsible to improve the EMS performance indicators. Therefore, evaluation of the current system is particularly important [6]. There is a significant difference in therapeutic interventions compared with international standard protocols. Accordingly, there is a need for systematic qualitative studies, equipment improvement, improving the quality of the educational curriculum, and therapeutic protocols to improve the EMS [7, 8]. Due to the lack of adequate and comprehensive data on the EMS performance to transfer patients with heart problems in Arak, we aimed to investigate the EMS performance to find its defects and resolve them by the authorities.

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## MATERIALS AND METHODS

In this retrospective cross-sectional study, the sheet mission of the patients suspected to heart problems based on their primary chief complaints that they were referred to Amir-Kabir and Amira-al-Momenin hospitals by the EMS from Mar 2011 to Jun 2012, were selected using convenience sampling. The age, sex, the time to announce the center for the mission, the time to move the ambulance, the time to arrive the scene, the time to arrive the hospital, vital signs and the interventions by EMS personnel was recorded. The recording system of the 115 emergency regarding the time and number of missions was used to determine the considered time.

Data were analyzed using SPSS version 20 (version 20, SPSS Inc., Chicago, IL, USA) and statistical methods to determine the frequency

of variables. In order to analysis the quantitative variables *t*-test was used.

The study was approved by the Research Council of the Arak University of Medical Sciences, all information related to the patients, and staff was kept confidential. The official permission was received from the authorities to use the forms and recordings.

## RESULTS

We surveyed 374 patients transported by EMS to the Amir-Kabir and Amir-al-Momenin hospitals due to heart problems and 186 patients [49.7%] were male. Other demographic data are shown in Table [1]. The most common complaints of patients were chest pain [57%], dyspnea [28.7%], sweating [19.3%], and nausea [16.3].

**Table 1:** Age distribution of patients was transferred by EMS due to heart problem.

Age [yr]	Frequency	Percent
<30	32	8.5
30-50	94	25.1
50-70	149	39.8
70-100	96	25.7
<b>Total</b>	<b>371*</b>	<b>99.2</b>
<b>54.77±18.87 mean± SD:</b>		

\* There are three missing data.

Emergency personnel evaluated the patients for vital signs (Table 2).

**Table 2:** Vital sign of patients were transferred by EMS due to heart problem.

Vital Sign		Frequency	Minimum	Maximum	Mean	Std. Deviation
<b>GCS</b>	Male	182	3.00	15.00	12.08	4.73
	Female	175	3.00	15.00	12.68	5.13
<b>Respiratory Rate</b>	Male	135	10.00	33.00	16.14	1.43
	Female	145	11	35	18.1	3.31
<b>Heart Rate</b>	Male	130	65.00	130.00	86.41	46.19
	Female	119	55	145	88.3	46.1
<b>Systolic BP*</b>	Male	137	100.00	180.00	134.40	39.69
	Female	144	97.1	185.3	133.5	41.1
<b>Diastolic BP*</b>	Male	139	58.00	117.00	81.90	13.95
	Female	140	61.3	121.3	79.60	13.7

\* Blood Pressure

The average interval time from receive the mission to move the ambulance was 58 sec, to arrival the scene [responding time] was 5.99

min, to stay at the scene was 13.4 min, and to arrival the hospital [transport time] was 11.43 min (Table 3).

**Table 3:** Mean interval time for mission to move, arrival the scene, stay at the scene, arrival the hospital in patients with heart problem.

Mean Interval Time indexes	Total	Urban	Suburban	P. valve
The mission to ambulance's move **	1.5±0.58	1.17±0.46	2.06±0.83	0.033
Responding Time *	5.9±6.04	5.7±6.02	6.5±6.14	0.282
Stay at scene*	13.4±7.1	13.7±7.18	12.8±7.01	0.287
Transport Time*	11.4±7.6	9.8±7.17	15.2±7.40	0.0001

\* Based on minute

Overall, 250 patients were transferred to hospital by EMS, while others referred to clinics as outpatient therapy (Table 4).

**Table 4:** Therapeutic interventions of patients with suspected heart problem. (IV: intra venous)

Therapeutic service	Frequency	%
O <sub>2</sub> therapy	179	47.9
Serum therapy	124	33.2
Air way management	62	16.6
Intubation	29	7.8
Suction	15	4
cardiopulmonary resuscitation	52	13.9
IV-line	244	65.2
Drug	164	43.9
Defibrillation	17	4.5

The average work experience of emergency personnel who did the mission was 5.99 yr. The minimum work experience was two years and

the maximum work experience was 28 yr. Other information related to the personnel is given in Table 5.

**Table 5:** Distribution of education degree of EMS personnel for patients with heart problem

Education degree	Frequency	Percent
Diploma degree	22	5.9
Associate's degree	280	74.9
Bachelor's degree	67	17.9
Total	369*	98.7

\* There are three missing data.

## DISCUSSION

This study aimed to evaluate the performance of EMS to transfer people with heart problem to the Amir-Kabir and Amira-al-Momenin hospitals in Arak.

In this study, 374 patients from 16 urban and suburban centers were studied. The average age of patients was  $54.77 \pm 18.87$  yr. Most of the patients 149 (40.2%) had 50-70 yr old and 96 (25.7%) patients had 70-100 yr old.

The average interval time from the mission to move ambulance was  $58 \pm 1.5$  sec. According to EMS national guideline, about 2 min is considered from the recorded mission to move from the center. The results showed that the personnel moved within the first minute. Although there is no study in Iran and even global standard regarding the average interval from the mission to move ambulance for citation, but according to the personnel's job description it is desirable. Therapeutic interventions for the patients were IV-Line fixation (65.2%), suction (4%), oxygen therapy (47.9%), serum therapy (33.2%), airway management (16.6%), intubation (7.8%), cardiopulmonary resuscitation (13.9%), and drug administration (Nitroglycerin tablets, Captopril and Aspirin) (43.9%). In a similar study in Tehran, the therapeutic interventions included oxygen therapy 39.5%, aspirin 9.44%, and nitroglycerin were 33.54% [8], and therefore in this study the recorded therapeutic interventions were lower than the international standards since according to international standards all of these interventions in people with heart disease should be complete [9].

The average Responding Time is recorded  $5.9 \pm 6.04$  min. The Responding Time to transfer trauma patients to the Tehran Rasoul-e-Akram Hospital was 12 min and 54 sec [7], while Nassiri et al. reported 7 min in urban areas, 14 min in suburban areas and 12 min in Tehran. The responding time is an important factor in evaluating the performance of EMS. In the standard protocol, this time should be less than 8 min [10, 11].

In this study, the average time to stay at the scene was  $13.4 \pm 7.1$  min and the transport time was  $11.4 \pm 7.6$ . The average time to stay at the scene in the trained personnel was more than others were. The average time to stay at the scene was 8.77 min and to transfer by helicopter was about 18 min [12]. The average transport time in Tehran is estimated 34 min, while, it is reported 9 min in Dalvandi et al. study [7,13], which can be due to Tehran extent compared with smaller cities.

There was a significant difference in the average interval from the mission to move ambulance and the average interval from scene to the hospital in the urban and suburban centers. The average time in the suburban centers was more than urban centers.

In this retrospective study, the recorded forms were used. The illegible mission forms were analyzed as missing data due to the problems in recording. The study last 3 months, considered as limitations of this study, since, there may be differences in the number of suspected cases of heart problem patients in different seasons. On the other hand, it is possible that some patients were transferred to other hospitals.

## Conclusion

The interval to prepare for mission, the interval to arrival the scene and the interval time to transfer the patients to hospitals is desirable compared with other studies, while, the time spent on the scene and the interventions are not favorable compared with other studies and need improvement. In this regard, in order to improve the EMS, systematic qualitative studies, equipment improvement, improving the quality of the educational curriculum and treatment protocols are recommended.

It is recommended that similar studies be done on other patients and in the Red Crescent centers.

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