# Physician perceptions and recommendations about pre-hospital emergency medical services for patients with ST-elevation acute myocardial infarction in Abu Dhabi

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*Introduction:* **Physician perceptions about emergency medical services (EMS) are important determinants of improving pre-hospital care for cardiac emergencies. No data exist on physician attitudes towards EMS care of patients with ST-Elevation Myocardial Infarction (STEMI) in the Emirate of Abu Dhabi.**

*Objectives:* **To describe the perceptions towards EMS among physicians caring for patients with STEMI in Abu Dhabi.**

*Methods:* **We surveyed a convenience sample of physicians involved in the care of patients with STEMI (emergency medicine, cardiology, cardiothoracic surgery and intensive care) in four government facilities with 24/7 Primary PCI in the Emirate of Abu Dhabi. Surveys were distributed using dedicated email links, and used 5-point Likert scales to assess perceptions and attitudes to EMS.**

*Results:* **Of 106 physician respondents, most were male (82%), practicing in emergency medicine (47%) or cardiology (44%) and the majority (63%) had been in practice for >10 years. Less than half of the responders (42%) were ''Somewhat Satisfied'' (35%) or ''Very Satisfied'' (7%) with current EMS level of care for STEMI patients. Most respondents were ''Very Likely'' (67%) to advise a patient with a cardiac emergency to use EMS, but only 39% felt the same for themselves or their family. Most responders were supportive (i.e. ''Strongly Agree'') of the following steps to improve EMS care: 12-lead ECG and telemetry to ED by EMS (69%), EMS triage of STEMI to PCI facilities (65%), and activation of PCI teams by EMS (58%). Only 19% were supportive of pre-hospital fibrinolytics by EMS. There were no significant differences in the responses among the specialties.**

*Conclusions:* **Most physicians involved in STEMI care in Abu Dhabi are very likely to advise patients to use EMS for a cardiac emergency, but less likely to do so for themselves or their families. Different specialties had concordant opinions regarding steps to improve pre-hospital EMS care for STEMI.**



*Keywords:* Emergency Medical Services, ST Elevation Myocardial Infarction, Survey

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## Introduction

According to the World Health Organization, cardiovascular disease is the number one cause of death globally. In 2013, it was estimated that 17.5 million people died of cardiovascular disease, representing 31% of all global deaths [1]. In the United Arab Emirates (UAE), mortality statistics from 2008 to 2010 showed that cardiovascular disease was the leading cause of death among both UAE nationals and expatriates in the Emirate of Abu Dhabi [2]. The *Weqaya* program, a preventive public health initiative established by Health Authority Abu Dhabi in 2008, sets targets to address cardiovascular disease in the emirate. By 2015, the aim is to reduce cardiovascular disease events by 10% and by 2030, an expected 40% reduction in events and 75% reduction in mortality [3].

In acute coronary syndromes (ACS), and in particular ST elevation myocardial infarction (STEMI), prompt reopening of occluded vessels is essential in order to restore myocardial perfusion [4]. Evidence has linked longer treatment delays with increased mortality [5,6]. Therefore, all possible measures should be undertaken to minimize the time from symptom onset to reperfusion of the ischemic area [7]. While improving door-to-balloon times is a critical component of STEMI care, it may not always translate into direct improvements in mortality, suggesting that the time before arrival at the hospital may be just as important [8]. Both the time from arrival to electrocardiogram (ECG) and the time from ECG to catheterization laboratory activation are shorter in patients transported by emergency medical services (EMS), with some data indicating an improved outcome in patients transported by EMS [9–12].

These findings highlight the importance of patients utilizing EMS, along with rapid and effective EMS treatment and transport, in minimizing total ischemic time [13,14].

A particular benefit of EMS transport of STEMI patients is the ability to acquire a 12-lead ECG before arrival at the hospital, where the ECG can be transmitted to the hospital, triggering the activation of the catheterization laboratory to be ready upon the patient's arrival and thereby significantly reducing the time from symptom onset to reperfusion [15]. A study showed that this process saved more time (up to 15.4 minutes) than any other intervention [16].

While private transport can be quicker, door-to-balloon time is considerably shorter for patients using EMS. This is particularly true in the West where many systems have excellent prehospital advanced life support [17]. However, these advantages gained by EMS transport are limited in many other countries. While EMS protocols in Abu Dhabi currently allow for the performance of a 12-lead ECG, there is no system to transmit data to receiving facilities. Systematic catheterization laboratory activation by both EMS and prehospital care physicians has been demonstrated to be both feasible and accurate [18].

**Abbreviations**

| | |
|---|---|
| ACS | acute coronary syndromes |
| EMS | emergency medical services |
| Gulf RACE | Gulf Registry of Acute Coronary Events |
| UAE | United Arab Emirates |
| ED | emergency department |
| PCI | percutaneous coronary intervention |

The Gulf Registry of Acute Coronary Events (Gulf RACE), representing the Arab Gulf States, revealed that EMS was not a common mode of transport utilized by STEMI patients (chosen by only 17% of patients), similar to findings in other international studies [19–21]. While the patient clearly has a stake in making the decision to use EMS or private transport, the physician also plays an intimate role, with involvement in patient education and guidance at discharge. Understanding physicians' perceptions of transportation practices can ultimately help improve access for STEMI patients.

The objective of the present study is to describe perceptions towards EMS among physicians caring for patients with STEMI in Abu Dhabi.

## Methods

### *Study setting*

The Emirate of Abu Dhabi covers an area of 83,600 $km^2$ and has a population of 2.33 million (of which 475,000 are UAE nationals). There are five government-funded facilities that operate cardiac catheterization services, four of which are under the Abu Dhabi Health Services Company (SEHA) and one operated by the Directorate of Medical Services of the UAE Armed Forces. EMS are operated by the Abu Dhabi Police Emergency and Public Safety Department, in conjunction with National Ambulance Company LLC, which provides emergency medical technicians and paramedics. EMS are able to perform 12-lead ECG, but at the time of writing, there is no pre-hospital telemetry to catheterization

laboratory facilities. Approval to conduct the survey was obtained from the research ethics committees of all five facilities.

### *Design*

Between June 2012 and December 2013, we administered a survey to a convenience sample "voluntary, non-random sampling" of 195 physicians typically involved in the care of patients who present to hospital emergency departments (ED) with suspected ACS. We included physicians from emergency medicine, cardiology, cardiothoracic surgery, and intensive care medicine. Prior to distribution, face validity was obtained by sending the survey to a pilot group of ten physicians involved in STEMI care. Distribution was performed using dedicated email links through SurveyMonkey (Palo Alto, CA, USA).

The survey utilized two five-point Likert scales, as well as general demographic questions. Frequencies and proportions were also computed for the following outcome variables:

1. The likelihood of advising an ACS patient to use EMS to go to hospital;
2. Satisfaction with the current EMS level of care given to ACS patients;
3. Likelihood of using the EMS for themselves or their family if a cardiac emergency occurs; and
4. Opinions regarding the steps that they felt could be taken to further improve EMS and prehospital ACS care.

### *Ethical considerations*

The study was approved by the Research Ethics Committees/Institutional Review Boards of Sheikh Khalifa Medical City, Mafraq, Al Ain, and Tawam hospitals as well as the University of Cape Town Human Research Ethics Committee. All physicians were informed that submission of a completed survey implies consent to participate in the study.

### *Data analysis*

Both descriptive and inferential statistical analyses were performed using SPSS Version 22.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were computed for the demographic and background characteristics of the participants including frequencies and percentages for sex, nationality, age group, native language, specialty, years in the current practice, and length of practice in the UAE.

Standard descriptive statistics were used to summarize the data. Mean ± standard deviation and proportions were used to summarize continuous and categorical variables, respectively. The chi-square test was used to detect correlations between specialty (emergency medicine, cardiology, and other) and responses to survey questions about the likelihood of advising an ACS patient to use EMS to go to the hospital, satisfaction with the current EMS level of care given to ACS patients, likelihood of using EMS for themselves or their family if ACS occurs, and opinions regarding the steps they felt could be taken to further improve EMS and prehospital ACS care.

## Results

Data were collected for a total of 106 physicians who responded, and descriptive statistics are presented in Table 1. Respondents were ethnically diverse, and predominantly male (n = 87, 82.1%). Most were practicing in emergency medicine (47%) or cardiology (44%), and the majority (63%) had been in practice for >10 years (Table 1).

Table 2 indicates respondents' perceptions of EMS services and the likelihood of recommending

*Table 1. Descriptive Statistics for Participant Demographic and Background Characteristics (n = 106).*

| Variable | *n* | % |
|---|---|---|
| Nationality | | |
| India | 17 | 16.0 |
| Non-UAE Arab national | 31 | 29.2 |
| Other | 31 | 29.2 |
| Pakistan | 13 | 12.3 |
| UAE | 13 | 12.3 |
| United States | 1 | .9 |
| Age group | | |
| 27 or younger | 2 | 1.9 |
| 28 to 37 | 27 | 25.5 |
| 38 to 47 | 37 | 34.9 |
| 48 to 57 | 35 | 33.0 |
| 58 or older | 5 | 4.7 |
| Home language | | |
| Arabic | 50 | 47.2 |
| English | 30 | 28.3 |
| Other | 26 | 24.5 |
| Specialty | | |
| Cardiology | 47 | 44.3 |
| Emergency Medicine | 50 | 47.2 |
| Other | 9 | 8.5 |
| Number of years in this practice | | |
| <2 | 4 | 3.8 |
| 2 to 5 | 15 | 14.2 |
| 5 to 10 | 20 | 18.9 |
| >10 | 67 | 63.2 |
| Length of practice in UAE | | |
| Less than 2 years | 17 | 16.0 |
| 2 to 5 years | 39 | 36.8 |
| 5 to 10 years | 27 | 25.5 |
| More than 10 years | 23 | 21.7 |

*Table 2. Percentage of Cardiology Participants (n = 47), Emergency Medicine Participants (n = 50), and Other Participants (n = 9) Providing Each Response to Perceptions of Ambulance Services Items (N = 106).*

| | | Very Unsatisfied | Somewhat Unsatisfied | Neutral | Somewhat Satisfied | Very Satisfied | *p* |
|---|---|---|---|---|---|---|---|
| How satisfied are you with the current ambulance services level of care given to Acute Coronary Syndrome (ACS) patients? | Cardiology | 2.1 | 23.4 | **31.9** | 29.8 | 12.8 | 0.06 |
| | Emergency medicine | 12.0 | 8.0 | **42.0** | 36.0 | 2.0 | |
| | Other | 0.0 | 11.1 | 33.3 | **55.6** | 0.0 | |
| | Total | 6.6 | 15.1 | **36.8** | 34.9 | 6.6 | |
| Item | Group | Very Unlikely | Somewhat Unlikely | Neutral | Somewhat Likely | Very Likely | *p* |
| If a patient with a cardiac emergency contacts you directly, how likely are you to advise that them to use the ambulance services to go to hospital? | Cardiology | 2.1 | 6.4 | 8.5 | 27.7 | **55.3** | 0.43 |
| | Emergency medicine | 2.0 | 0.0 | 6.0 | 16.0 | **76.0** | |
| | Other | 0.0 | 0.0 | 0.0 | 22.2 | **77.8** | |
| | Total | 1.9 | 2.8 | 6.6 | 21.7 | **67.0** | |
| How likely are you to use the ambulance services for you or your family, if a cardiac emergency occurs? | Cardiology | 10.6 | 6.4 | 17.0 | **25.5** | 40.4 | 0.25 |
| | Emergency medicine | 10.0 | 10.0 | 28.0 | **14.0** | 38.0 | |
| | Other | 0.0 | 0.0 | 11.1 | **55.6** | 33.3 | |
| | Total | 9.4 | 7.5 | 21.7 | **22.6** | 38.7 | |

*Notes:* Table entries are percentages. *p* values are from chi-square tests of independence. Medians are presented in bold.

them to patients and family members. Physician satisfaction with EMS varied with approximately one third feeling neutral (36.8%), another third (34.9%) somewhat satisfied, and 15.1% somewhat dissatisfied. Only 6.6% were very satisfied and a similar minority were not satisfied. If contacted by a patient with a cardiac emergency, nearly nine out of ten physicians were either somewhat likely (21.7%) or very likely (67.0%) to advise the patient to use an ambulance for transport to a hospital. Of the same respondents, about six out of ten were somewhat likely (22.6%) or very likely (38.7%) to do the same for themselves or a family member.

Table 2 also includes the survey findings stratified by physician specialty. There were no significant differences between the specialist groups for any of the three survey questions or their opinions regarding steps to improve EMS care. Despite the above findings, several are worth noting. Emergency medicine doctors (76.0%) were more likely than cardiologists (55.3%) to advise patients with cardiac emergencies to use ambulance services to go the hospital. Emergency medicine doctors were also less satisfied with the level of care given to ACS patients through the ambulance service (with only 2.0% very satisfied) when compared to cardiologists (among whom 12.8% were very satisfied).

Table 3 shows the responses to the eight survey items related to specific steps that could be taken to improve ambulance services and prehospital ACS care. Physicians were the most supportive, with nearly nine out of ten responding with ''Agree'' or ''Strongly Agree'', of prehospital 12-lead ECG by EMS with telemetry to ED and of EMS triage of confirmed STEMI patients directly to PCI facilities. There was also strong support for better training of ambulance staff to care for STEMI patients, activation of catheterization laboratory teams by EMS services, and STEMI patients bypassing the ED to the catheterization laboratory directly. Prehospital fibrinolysis by EMS had the least support with one third of physicians having a ''Neutral'' response and about one in four (26.4%) disagreeing or strongly disagreeing with that intervention.

## Discussion

EMS infrastructure is a critical component of improving EMS use, and physicians involved in STEMI care are natural advocates for improving EMS use and developing its infrastructure. Therefore, determining if a dissociation exists between physician attitudes and guideline recommendations is relevant.

Understanding how these ''natural advocates'' of EMS feel about the current status (perceptions) and how these can be improved (recommendations) is an important step towards improving EMS care in the region.

The current study was the first systematic description of physicians' perceptions and recommendations regarding EMS care of patients with STEMI in the Emirate of Abu Dhabi. Physician satisfaction with the current status of EMS

*Table 3. Percentage of Cardiology Participants (n = 47), Emergency Medicine Participants (n = 50), and Other Participants (n = 9) Providing Each Response to Items Related to Potential Improvements in Ambulance Services (N = 106).*

| | | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | *p* |
|---|---|---|---|---|---|---|---|
| More availability of ambulances | Cardiology | 2.1 | 4.3 | 8.5 | **36.2** | 48.9 | 0.19 |
| | Emergency medicine | 4.0 | 0.0 | 26.0 | **32.0** | 38.0 | |
| | Other | 11.1 | 0.0 | 33.3 | **11.1** | 44.4 | |
| | Total | 3.8 | 1.9 | 18.9 | **32.1** | 43.4 | |
| Better training of ambulance staff | Cardiology | 2.1 | 0.0 | 10.6 | 27.7 | **59.6** | 0.12 |
| | Emergency medicine | 4.0 | 0.0 | 8.0 | 26.0 | **62.0** | |
| | Other | 11.1 | 0.0 | 11.1 | 22.2 | **55.6** | |
| | Total | 3.8 | 0.0 | 9.4 | 26.4 | **60.4** | |
| EMS Use of 12 lead ECG and telemetry to ED | Cardiology | 2.1 | 0.0 | 4.3 | 27.7 | **66.0** | 0.19 |
| | Emergency medicine | 4.0 | 0.0 | 10.0 | 12.0 | **74.0** | |
| | Other | 11.1 | 0.0 | 22.2 | 11.1 | **55.6** | |
| | Total | 3.8 | 0.0 | 8.5 | 18.9 | **68.9** | |
| EMS use of fibrinolytic therapy | Cardiology | 6.4 | 8.5 | 34.0 | **25.5** | 25.5 | 0.11 |
| | Emergency medicine | 20.0 | 16.0 | **40.0** | 8.0 | 16.0 | |
| | Other | 11.1 | 22.2 | **44.4** | 22.2 | 0.0 | |
| | Total | 13.2 | 13.2 | **37.7** | 17.0 | 18.9 | |
| EMS triage of confirmed STEMI patients direct to PCI facilities | Cardiology | 4.3 | 0.0 | 2.1 | 23.4 | **70.2** | 0.67 |
| | Emergency medicine | 4.0 | 2.0 | 12.0 | 20.0 | **62.0** | |
| | Other | 11.1 | 0.0 | 11.1 | 22.2 | **55.6** | |
| | Total | 4.7 | .9 | 7.5 | 21.7 | **65.1** | |
| Activation of cath lab by prehospital services | Cardiology | 6.4 | 2.1 | 17.0 | 17.0 | **57.4** | 0.99 |
| | Emergency medicine | 6.0 | 4.0 | 14.0 | 20.0 | **56.0** | |
| | Other | 11.1 | 0.0 | 11.1 | 11.1 | **66.7** | |
| | Total | 6.6 | 2.8 | 15.1 | 17.9 | **57.5** | |
| STEMI patients bypassing the ED to cath lab directly | Cardiology | 2.1 | 8.5 | 8.5 | 25.5 | **55.3** | 0.24 |
| | Emergency medicine | 12.0 | 8.0 | 10.0 | **26.0** | 44.0 | |
| | Other | 11.1 | 0.0 | 33.3 | **33.3** | 22.2 | |
| | Total | 7.5 | 7.5 | 11.3 | **26.4** | 47.2 | |
| Punctuality (speed with which ambulances arrive) | Cardiology | 2.1 | 0.0 | 19.1 | 23.4 | **55.3** | 0.08 |
| | Emergency medicine | 8.0 | 0.0 | 18.0 | 22.0 | **52.0** | |
| | Other | 0.0 | 11.1 | 22.2 | **33.3** | 33.3 | |
| | Total | 4.7 | .9 | 18.9 | 23.6 | **51.9** | |

*Notes:* Table entries are percentages. *p* values are from chi-square tests of independence. Medians are presented in bold.

STEMI care was variable and only a small minority was very satisfied. Nonetheless, most physicians would still advise patients with cardiac emergencies to use EMS, though they would less often do so for themselves or their families. There was strong support among the respondents for pre-hospital 12-lead ECG with telemetry to ED and triaging of STEMI patients to primary percutaneous coronary intervention (PCI) facilities, and bypassing of ED directly to catheterization laboratory and pre-hospital activation of primary PCI teams. Conversely, pre-hospital thrombolysis was not favored. Although there were some consistencies between cardiology and emergency medicine physicians, some differences were noted, including the finding that a higher percentage of emergency medicine physicians were very likely to advise a patient with a cardiac emergency to use the ambulance services to go to the hospital when compared to cardiologists. Thus, it appears that emergency medicine physicians are more confident in EMS than cardiologists. Emergency medicine physicians also appeared to be less satisfied with care for ACS patients than cardiologists.

The present report complements the existing literature of STEMI care in the Gulf region. The overwhelming majority of existing studies in the region focus on in-hospital care of patients with STEMI. Aside from the observation that EMS are underutilized by patients with ACS across the Gulf, we know very little about pre-hospital care of STEMI patients in the region.

While the present report does not describe pre-hospital care per se, it provides an equally important description of how physicians caring for STEMI patients perceive pre-hospital care and how they think it can be improved. Understanding these perceptions and recommendations is important for designing and implementing initiatives that would ultimately improve pre-hospital care of patients with cardiac emergencies.

The observation that physicians would still recommend EMS for their patients despite their modest level of satisfaction reflects a firm belief among them of the important role EMS can play in the pre-hospital care of patients with STEMI. This conviction should facilitate the active engagement of physicians from different specialties in system-wide initiatives to improve pre-hospital care of cardiac emergencies and raise public awareness of EMS role.

Several processes of pre-hospital care were favored by the physicians responding to the present survey. The strongest support was for obtaining a 12-lead ECG by EMS personnel with direct telemetry to ED physicians. Pre-hospital 12-lead ECG has been shown to shorten both scene and transport times for patients with STEMI, potentially leading to a reduction in total ischemic time [22], and has also been associated with shorter door-to-balloon times [23]. Respondents were also in favor of pre-hospital triage of patients with STEMI to primary PCI facilities, a strategy that has been associated with improved survival in a large regional primary PCI program [24]. On the other hand, there was little support for pre-hospital thrombolysis by EMS, likely reflecting the uncertainty in the literature around this strategy, and possible concerns about the availability of the required expertise and infrastructure to implement such a strategy [25].

The positions of the responding physicians towards the various pre-hospital processes of STEMI care are useful in setting priorities for pre-hospital initiatives where the most favored evidence-based interventions would be most acceptable and more likely to secure physician engagement.

While nearly nine out of ten physicians will advise patients with a cardiac emergency to use EMS, only six out of ten would do the same for themselves or their families. In other words, one third of physicians gave conflicting advice to their patients versus themselves or a family member.

We have no explanation of this finding and can only speculate on what it may reflect. It is possible that the response to the ''patient advice'' question is driven by a physician's desire to follow practice guidelines, while the behavior with self or family is influenced by their lack of high satisfaction with the current state of EMS care. The discrepancy in the responses may also reflect some uncertainty towards evidence derived from developed healthcare systems where EMS are more advanced and applied in less developed settings where further improvements are needed. Further studies are needed to understand the attitudes of physicians towards EMS.

The implementation of prehospital 12-lead ECG along with its routine use and early notification of the receiving facilities have long been recommended by the American Heart Association (AHA) [26]. While physician recommendations offered in this paper conform to those of the practice guidelines given for EMS by the AHA in their 2013 update [27], very few of these guidelines are applied as standard in this region.

## Limitations

Our findings are limited by the use of a convenience sample from which the findings may not be generalizable to all practicing physicians. However, our respondents practice in major hospitals in the Emirate of Abu Dhabi, providing care to the majority of STEMI patients in the emirate. Lack of statistical differences in the responses among the different specialties may be a function of the sample size, and a larger survey may detect differences among specialists. The perceptions and responses reported here may not reflect the opinions of physicians practicing in other parts of the Gulf region. Future studies should utilize larger and random samples.

## Conclusions

Professional practice guidelines recommend that patients make use of EMS during ACS, and most physicians involved in STEMI care in Abu Dhabi in this sample are very likely to advise patients to do so, but fewer are as likely to use EMS for themselves or their families. Most physicians were supportive of pre-hospital 12-lead ECG and triaging of patients to primary PCI centers. Different specialties had concordant opinions regarding steps to improve pre-hospital EMS care for STEMI. Feedback from physicians involved in the care of ACS patients can be used to further improve care provided by EMS as well as increase the use of EMS for themselves and their patients.

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