

# A Survey on the Choice of Transportation to come to Emergency Department among Patients with Acute Coronary Syndrome of A Community in Malaysia

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## SUMMARY

**Background:** Good coronary care begins from the patient's home, including early transportation. As such, it is recommended that the patients activate ambulances, rather than to use their own transportations to reach the hospitals. It is not known whether Malaysian patients prefer to use private transportations or ambulances when they develop chest pain.

**Objectives:** This study is conducted to explore the question of the choice of transportation modes among patients with acute coronary syndrome and the reasons behind their choices.

**Methods:** This is a structured interview survey on patients diagnosed with acute coronary syndrome (ACS) in emergency department of Hospital Universiti Sains Malaysia from April 2012 to September 2012.

**Results:** Out of the 110 patients surveyed, 105 (95.5%) patients chose to use own transportation when they developed symptoms suggestive of ACS. Only 3 patients (2.7%) came to the emergency department within 1 hour of onset, and all these 3 patients chose to use ambulances as their modes of transportation. None of the patients who chose own transportation came within the first hour of symptoms onset. This is shown to be statistically significant ( $p < 0.001$ ). The level of education as well as past history of ischemic heart disease did not significantly influence the patients' choice of transportation.

**Conclusion:** The admonishment by various international resuscitation councils that patients with chest pain should be transported via ambulances may not be as straightforward as it seems. Numerous local and regional socio-cultural and logistic factors may need to be addressed.

## KEY WORDS:

*Ambulance use, transportation, pre-hospital, chest pain, acute coronary syndrome, patient education*

## INTRODUCTION

Good coronary care begins from the patient's home. A good patient education with an emphasis on the importance of

early symptom recognition, early activation of emergency medical services, early transportation to the hospital and early administration of definitive treatment ultimately helps to translate into better outcome of a patient with acute coronary syndrome.<sup>1</sup>

As such, the American College of Cardiology and the American Heart Association recommend that the patients' family members should activate the emergency medical services, rather than to use their own transportation to the hospitals.<sup>1,2</sup> Such strategy would enable the transportation time to be shortened as well as for the patients to receive proper pre-hospital life-saving interventions, particularly cardiopulmonary resuscitation (CPR) and defibrillation.<sup>1,2</sup> A delay of as little as 30 minutes in the administration of reperfusion therapy for ST segment elevation myocardial infarction (STEMI), for example, may reduce life expectancy by an average of 1 year.<sup>3</sup> It has been shown that there is a significant association between the time taken by the ambulance to arrive to the emergency department (ED) by ambulance and the speed at which the patients can receive early reperfusion therapy.<sup>4</sup>

Unfortunately, many patients with STEMI do not activate the emergency medical services and are therefore not transported by the ambulances.<sup>2,4</sup> In a 2011 observational study from the ACTION Registry-Get-With-The-Guideline (GWTG), ambulance transportation was used by 60% of patients with ST-elevation myocardial infarction,<sup>2</sup> and in a similar recent study done in the Arabian Gulf countries, the percentage of ambulance used by patients with acute coronary syndrome (ACS) was 25%.<sup>5</sup>

In fact, it has been shown that an average STEMI patient does not seek medical care for approximately two hours after symptom onset, and this pattern has been shown to be unchanged over the last decade.<sup>1,6</sup> The Rapid Early Action for Coronary Treatment (REACT) multi-center trial, for example, found that the median pre-hospital delay was 2.0 hours, and 25% of these patients delayed for more than 5.2 hours.<sup>7</sup> The National Registry of Myocardial Infarction 3 (NRMI-3) trial, on the other hand, found a 5.96 hours delay of presentation among patients with acute coronary syndrome,<sup>8</sup> and in a recent Iranian study, more than 50% of the patients in that study delayed in seeking treatment.<sup>9</sup>

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Leslie *et al* (2000)<sup>10</sup> reported that only 25% of patients with acute myocardial infarction (AMI) sought treatment within 1 hour and up to 40% of patients delayed for more than 4 hours after symptoms onset before seeking treatment. They concluded that the main reason for the delay in seeking treatment is due to the perception by the patients that their symptoms were not serious enough to warrant ambulance help and were hoping that their symptoms would eventually subside.<sup>10</sup>

Nonetheless, much of what we know regarding the care-seeking behavior of patients during prehospital phase is drawn from studies done in the West. There have been postulations that culture and differences in health systems may influence an Asian patient's choice and care-seeking behavior as compared to his Western counterpart.<sup>11</sup> In a study done to look at the differences in care-seeking behavior among a Japanese cohort as compared to an American cohort, Liao *et al* (2004)<sup>11</sup> found that a Japanese patient is significantly more likely to delay seeking treatment in an emergency department as compared to an American despite the fact that Japan's national health care system actually mandates universal insurance coverage.

However, the care-seeking behavior of our Malaysian patients is generally unknown. It is not known whether our Malaysian patients prefer to use private transportation or ambulances when they develop chest pain. How much are they aware of the urgency and importance of seeking early treatment when they suffer from a heart attack is also largely unknown. The objective of this study is to explore the choice of transportation among patients diagnosed with acute coronary syndrome in the emergency department, Hospital Universiti Sains Malaysia, the reasons behind their choices as well as the related questions on symptoms awareness.

## MATERIALS AND METHODS

This is a cross-sectional study consisting of face-to-face structured interviews on patients diagnosed with acute coronary syndrome (ACS) in emergency department of Hospital Universiti Sains Malaysia from April 2012 to September 2012. Convenience sampling was applied; and all patients diagnosed with acute coronary syndrome in the emergency department of HUSM were invited to participate. Patients in cardiac arrest, shock as well as in conditions requiring emergency and resuscitation measures were excluded. Interviews were conducted only once the patients had been stabilized in wards. All interviews were conducted by one of the researchers (Dr. Wan Masliza Wan Mohd Annuar) who had 6 years of experience of working in the emergency department and was a third year postgraduate trainee in emergency medicine in Universiti Sains Malaysia.

Sample size estimation for this study was performed using a two-proportion estimation based on a previous study by Johansson, Stromberg and Swahn (2004)<sup>12</sup>. In that study<sup>12</sup>, the proportion of those who chose to use ambulance when the patients perceived that the chest pain was unbearable was 51% (35 out of 68) and those who chose to use their own transportation was the chest pain was similarly perceived as unbearable was 23% (10 out of 42). With 80% power and a confidence interval of 95%, the sample size for this study was

estimated to be 42 per arm or 84 for both arms. By including a dropout rate of 20%, the minimum total sample size included for this study is 101.

Hospital Universiti Sains Malaysia is one of the two tertiary public hospitals in the city of Kota Bharu with a capacity of 723 ward beds. It is also a teaching and research hospital for Universiti Sains Malaysia. The public ambulance services are offered free by the Government of Malaysia to the Malaysian public and are usually manned by the paramedics. The private ambulance service is offered on a smaller capacity as a paid service although majority of the Malaysian public would utilize the public ambulance services. The number 999 is a single emergency number implemented in Malaysia since July 2007 to cater for all types of emergencies, regardless of whether it is a health related emergency or non-health related emergency call.

The survey questions that were asked in the structured interviews as well as the response results by our participants are listed in Table 1. These questions were adapted from questions used in the study by Johansson, Stromberg and Swahn (2004)<sup>12</sup>, and translated into the Malay language. These questions were previously validated<sup>11</sup> and a face validation of the translated version of this questionnaire was determined with the help of three emergency medicine lecturers from Universiti Sains Malaysia. The criteria that was used for the diagnosis of ACS is the criteria by the American College of Cardiology and American Heart Association, namely, a clinical syndrome defined by characteristic symptoms suggestive of myocardial ischemia with or without persistent relevant electrocardiographic changes and/or release of biomarkers of myocardial necrosis.<sup>1</sup> Research ethical approval was obtained from our institutional research review board.

The dependent outcome in our study is the dichotomous choice of transportation, i.e., whether patients chose to call for an ambulance or not when they experienced chest pain. All independent variables in this study are dichotomous variables except for age. Chi square test or Fisher exact test was used to analyze the association between these dichotomous independent variables and the outcome of choice of transportation. Simple bivariate regression analysis, where necessary, were used to analyze the relationship between the choice of transportation with these various independent variables. All statistical analyses were computed using Statistical Package for Social Sciences (SPSS) version 18.0.

## RESULTS

A total of 110 patients with acute coronary syndrome were interviewed during the study period. Out of these 110 patients, 75 (68.2%) were male patients, 35 (31.8%) were female. The mean age of our study population was 59.2 (S.D. +/- 11.3) years. An overwhelming majority of 105 (95.5%) patients said that they came using their own transportations rather than calling for an ambulance (see Table 1).

Interestingly, up to half of our patients [55 patients (50%)] had past history of ischemic heart disease. Out of these 55 patients with past history of ischemic heart disease, as high

Table I: Descriptive analysis of the participants

Characteristics	Total n = 110 (%)
Mean Age (in years)	59.2 (S.D. +/- 11.3)
Gender	
Male	75 (68.2)
Female	35 (31.8)
Past history of ischemic heart disease	
Yes	55 (50%)
No	55 (50%)
Education level	
Pre-diploma level	89 (80.9)
Diploma level and above	21 (19.1)
Mode of transportation	
Own transportation	105 (95.5)
Ambulances	5 (4.5)
Symptoms	
Chest pain	92 (83.6)
Shortness of breath	85 (77.3)
Sweating	53 (48.2)
Nausea & vomiting	23 (20.9)
Giddiness	22 (20.0)
Are you aware that your symptoms could be due to heart attack?	
Yes	52 (47.3)
No	58 (52.7)
How long did you wait before you decided to come to the hospital?	
Less than 1 hour from symptoms onset	3 (2.7)
1 – 3 hours from symptoms onset	33 (30.0)
3 – 12 hours from symptoms onset	42 (38.2)
More than 12 hours after symptoms onset	32 (29.1)

Table II: Categorical analysis of choice of transportation with various independent variables of patient's characteristics and symptoms

Choice of transportation / Independent variables	Not using ambulance n = 105	Using ambulance n = 5	p
Gender			
Male	72 (68.6%)	3 (60.0%)	0.652*
Female	33 (31.4%)	2 (40.0%)	
Past history of ischemic heart disease			
Yes	53 (50.5%)	2 (40%)	1.0*
No	52 (49.5%)	3 (60%)	
Education level			
Up to secondary level	84 (80.0%)	5 (100%)	0.581*
Post-secondary level	21 (20.0%)	0 (0)	
Symptoms			
Chest pain			
Yes	88 (83.8%)	4 (80.0%)	1.0*
No	17 (16.2%)	1 (20.0%)	
Shortness of breath			
Yes	81 (77.1%)	4 (80.0%)	1.0*
No	24 (22.9%)	1 (20.0%)	
Sweating			
Yes	54 (51.4%)	2 (40.0%)	1.0*
No	51 (48.6%)	3 (60.0%)	
Nausea & vomiting			
Yes	23 (21.9%)	0 (0)	0.582*
No	82 (78.1%)	5 (100%)	
Giddiness			
Yes	21 (20.0%)	1 (20.0%)	1.0*
No	84 (80.0%)	4 (80%)	
Are you aware that your symptoms could be due to heart attack?			
Yes	50 (47.6%)	2 (40.0%)	1.0*
No	55 (52.4%)	3 (60.0%)	
How long did you wait before you decided to come to the hospital?			
Less than 1 hour from symptoms onset	0 (0)	3 (60.0%)	<0.001
1 hour or more from symptoms onset	105 (100%)	2 (40.0%)	

\*Fisher's exact test was used in all cases, as the expected count of less than 5 is more than 20%.

Table III: Reasons for not using ambulance among patients who came by their own transportations

Reasons	N
"Did not consider my condition as serious or sick enough"	49 (46.7%)
"Unnecessary to call ambulance"	49 (46.7%)
"It is easier and more convenient to use my own transportation"	44 (41.9%)
"I can reach the hospital faster by using my own transportation"	32 (30.5%)
"Did not cross my mind/did not think about calling ambulance"	14 (13.3%)
"Did not know how to call ambulance"	1 (1.0%)

as 53 patients (or 96.4% of them) chose their own transportation and only the other two of them used ambulance services. This means that the presence of past history of ischemic heart disease did not increase the likelihood of choosing ambulance as their mode of transportation ( $p = 1.0$ ) (see Table II).

Similarly, when asked about their education level, 21 patients (19.1%) have education qualification from diploma level and above. However, categorical analysis performed did not reveal any statistical association between education level and the choice of transportation mode as all these 21 patients with education level from diploma and above chose to use their own mode of transportation rather than calling for an ambulance ( $p = 0.582$ ) (see Table II).

Among the 105 who decided not to use ambulance, we asked them regarding the reasons behind their decision. Some of the common reasons given for not calling ambulance include "I did not consider my condition as serious or sick enough to warrant calling for ambulance" [49 patients (46.7%)], "it is easier and more convenient to use my own transportation rather than to call for an ambulance" [44 patients (41.9%)] and "I can reach the hospital faster by using my own transportation" [32 patients (30.5%)]. One patient even said that he did not know how to call for an ambulance (see Table 3).

Furthermore, from Table I, when asked about their symptoms, the most common symptom reported in our cohort was chest pain [92 (83.6%) patients] followed by shortness of breath [85 patients (77.3%)]. Other symptoms reported include sweating [53 patients (48.2%)], nausea & vomiting [23 patients (20.9%)] and giddiness [22 patients (20.0%)]. However, only 52 (47.3%) of patients said that they were aware that their symptoms could be due to a heart attack. And out of these 52 patients who were aware of the possibility of a heart attack, 50 of them chose to use their own transportation, which again, showed that there is no statistical significant correlation between awareness of symptoms and the choice of transportation ( $p = 1.0$ ) (Table II). Similarly, categorical analyses performed on these independent variables did not reveal any statistical association between these variables and the choice of transportation.

But when the relationship between the choice of transportation and the time the patients waited ("How long did you wait before you decided to come to the hospital?") before they actually come to the hospital, it is found that out of the five patients who chose to call for an ambulance, 3 of them (60%) chose to do so within one hour from the onset of

their symptoms. On the contrary, those who chose to use their own mode of transportation, none of them arrived at the emergency department within the first hour from the onset of their symptoms. This suggest that those who decided to call for an ambulance did so in a significantly shorter time than those who chose to use their own transportation ( $p < 0.001$ ) (Table III).

A bivariate logistic regression performed to determine the relationship between age of the patients and their choice of transportation also shows that there is no statistical relationship between these two variables (odds ratio or Exp(B) = 1.06, C.I. 0.96 – 1.14,  $p = 0.228$ ).

## DISCUSSION

The findings of our study are significant in a number of ways. First, it shows a rather unfortunate trend that up to 95.5% of the patients surveyed chose to use their own transportation. Comparatively, in a 2011 observational study from the ACTION Registry–GWTG, ambulance transport was used for up to 60% of patients with ST-elevation myocardial infarction.<sup>2</sup> Earlier studies have indicated that ambulances were used by at least 30 – 60% of patients with chest pain.<sup>4,12-15</sup> Secondly, it is equally worrying that the majority (96.4%) of our patients with past history of ischemic heart disease still chose to use their own transportation, rather than to call for an ambulance. This is a matter of concern that needs to be explored further in future studies as it has been generally shown that patients with prior history of acute coronary events should be more aware of the significance of delayed medical treatment; and hence they should be more alarmed and should have taken a shorter time to reach the hospital.<sup>16</sup>

We also found that even the patient's educational level apparently does not have a significant correlation with the choice of their transportation mode. Finally, less than half of our study population was actually aware that their symptoms could be due to a heart attack.

Common reasons given by our patients for not using ambulance include the perception that their conditions are not serious enough to warrant calling an ambulance as well as the relative convenience of using their own transportations. These findings that are hardly surprising given that similar findings were reported in many previous studies done elsewhere.<sup>2,4,12,16</sup> Naturally, non-disruptive symptoms would tend to be ignored as much as possible. Disruptive and disabling symptoms on the other hand, would be attended to, leading the patient to seek treatment in a hospital. In other words, how the patient perceive the seriousness of their symptoms as well as how they employ

illness-related coping strategies such as denial of illnesses would also determine their decision on the speed and mode of transportation.<sup>15</sup> One patient even reported that he did not know how to call for an ambulance despite the fact that emergency call number in Malaysia has been standardized and simplified to only “999” since 2007.<sup>17</sup>

These trends suggest that the dissemination of medical information on acute coronary syndrome either has been very scanty and scattered or it has not been trickling down effectively to our community. Perhaps launching a public educational media campaign (e.g. “time lost equals myocardium lost”) may help besides the usual tools like pamphlets and posters. Although generally the effectiveness of such media campaigns cannot be ascertained at this stage, we need to begin somewhere. Furthermore, the studies by Luepker *et al* (2000) and Wright *et al* (2001) have shown an increased ambulance use after a general media campaign was carried out.<sup>18,19</sup> The urgency to respond without delay should be so ingrained among our Malaysian public so much so that the decision to call for an ambulance would be as automatic as calling for an ambulance in a case of motor vehicle accident.

One positive trend that we found in this study is that among the five patients that chose to call for an ambulance, 3 of them did so within the first hour of symptoms onset. And the irony is, despite the fact that many patients cited their ability to arrive hospital faster by their own transportation, no patient from the cohort of those who chose their own transportation actually arrived within the first hour of their symptoms’ onset. This suggests that those who used their own transportation could have delayed in doing so although the causal relationship between these two could not be ascertained. One possibility is that, those who chose to use their own transportation decided to wait and see whether their symptoms would actually improved before deciding to come to the hospital. Or it could be the other way around – those who decided to wait and see for the progress of their symptoms found it more convenient to use their own transportation to come at their own leisure.

The other possibility is that those who chose to use ambulance were actually staying substantially further away from the emergency department. For this group of patients, it is more practical and appropriate to use their own transportations rather than to call for the ambulance. Calling for ambulance would require travelling twice the distance far and would have taken longer time as compared to using their own transportation. We did not take into consideration the distance between the patients’ houses from the emergency department. Such geographical issues, especially if it is legitimate, is much more complex and requires more than mere public education measures to counteract. It may even call for a re-mapping of ambulance coverage by the different healthcare facilities to ensure that ambulance from the nearest healthcare clinic or hospital is mobilized in order reach the patient in the earliest instance. Unfortunately, in Malaysia, this may not be as easy as it may appear due to policy issues beyond the scope of this article. Furthermore, some ambulances from health clinics are rather rudimentary and are not equipped with cardiac monitoring and defibrillator.

## LIMITATIONS

There are a number of limitations inherent to this study. Firstly, this study is confined to only participants from a single center. Therefore, the findings from this study may not be generalizable to other centers around Malaysia. Nonetheless, we believe that if the participants from the region of Kota Bharu perceived that they could reach the hospital faster by using their own transportation, this finding may be extrapolated to other regions such as Kuala Lumpur in Malaysia; given the traffic congestion in other bigger Malaysian cities such as Kuala Lumpur is a much more serious issue as compared to the traffic congestion in the city of Kota Bharu. The wide imbalance between the numbers of participants in the “own transportation” (n = 105) arm as compared to “using ambulance” (n = 5) may render any statistical comparison unreliable. Thirdly, our data depended very much on what the participants said; and this may be influenced by a lot of subjective interpretations. This is especially for the question “How long did you wait before you decided to come to the hospital?”; as the participants probably would not have measured the time interval accurately.

## CONCLUSION

The take-home message that could be gleaned from this study is that the admonishment by various international resuscitation councils for patients with chest pain to be transported via ambulances may not be as straightforward as it seems. Numerous local and regional socio-cultural and logistic factors may influence their choice of transportation. How the public perceived the efficiency of the ambulances as well as the perception of the impact of traffic congestion are important determinants. As such, local hospitals and countries may need to conduct regional studies to explore the various local factors and address these root causes before the recommendation to use ambulances could be well-received by the public.

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