

# Pre-Hospital Emergency Medical Service Response Time Phenomenon In Klang Valley: An Answer For The Society

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## ABSTRACT

This qualitative descriptive study, underpinned by naturalistic inquiry, explored the pre-hospital emergency medical service response time in Klang Valley by providing an in-depth information of the phenomenon. In this study, various levels of health care personnel participated in focus group discussion and semi-structured interview. The staff members consisted of many levels of category from the lower ranks up to the higher level administrative officers. Content analysis was employed in analysing all data. Every one of the key informants was aware of the importance of making immediate responses to each ambulance call received. They shared their thoughts, experiences, and challenges in achieving the ideal response time in line with international recommendations. There were five categories of issues that emerged and challenges that arose from delays in response time, namely, 1) insufficient key information; 2) inconsistent information leading to delayed arrival of ambulance; 3) traffic condition causing delay in ambulance speed; 4) lack of resources contributing to an increase in workload; and, 5) unassertiveness in the attitude of members of staff. The findings have provided an answer to the society with regard to the current pre-hospital emergency medical service issues related to delay in the service delivered. Thus, policy makers and pre-hospital health care service providers should develop a strategic action plan by focusing on these findings to reduce the response time of ambulance call.

*Key words: Pre-hospital emergency medical service, response time, qualitative study, content analysis, Klang Valley.*

## INTRODUCTION

The demands for pre-hospital emergency medical services (EMS) around the world have notably increased because of the way members of the society deal with both serious medical illnesses and the frequent risks of injuries they are exposed these days. It has been reported that this situation is getting serious, leading to high mortality rates caused by out-of-hospital cardiac arrest at a global scale. Consequently, out-of-hospital cardiac arrest has become a major public health problem and the survival rate has decreased over time (American Heart Association, 2010).

Effective pre-hospital EMS care is realized when the timely provision of care limits the cascade of events that otherwise quickly lead to death or lifelong disability (Beaglehole, 2003; Anderson & Taliaferro, 1998; Marson & Thomson, 2001; Husum et al., 2003). Many pre-hospital deaths can be prevented if the victims receive immediate and appropriate care. The health care delivery systems in most countries, including Malaysia, provide this pre-hospital EMS care system as a formal service. This is provided as the first point of contact for members of the public who require such health care services in life-threatening situations. Pre-hospital EMS

care acts as the gatekeeper in access to immediate care for reducing death and disability (Al-Shaqsi, 2010; Sayed, 2012; National Highway Transport Safety Administration (NHTSA), 2009; Sikka & Margolis 2005).

Since the services exist for public use, measuring the quality of pre-hospital care service is needed. This will ensure that ambulance and first response services, including the health care provided as pre-hospital care, are operating at peak efficiency. It is crucial to maintain the service at a high standard because it has a great impact; it can prevent deaths, reduce complication and suffering, and improve patients' outcomes (MacFarlane & Benn, 2003; Myers et al, 2008; Ming Ma, 2007; Moore, 1999; Sayed, 2012; Health Information & Quality Authority, 2010; NHTSA,2008). There is evidence from a classic study by Potter et al. (1988) which suggested patients' conditions had improved over 24 hours after arrival with effective response time during pre-hospital EMS. There are similar findings from other studies in Canada, Taiwan and Germany where the life-threatening situation of patients had improved when pre-hospital advanced care was given on time and the pre-hospital treatment had led to a significant reduction of early post traumatic deaths (Schuster & Shannon, 1994; Hu & Koo, 1996; Sampalis et al., 1997).

In Malaysia, the pre-hospital EMS system is controlled by the Medical Emergency Coordinator Center (MECC). This has been in the practice since early 2008 after endorsement by the parliament. MECC is under full purview of the Ministry of Health and funded by the federal government. Prior to this endorsement, the pre-hospital EMS in Malaysia had relied on non-profit organizations and there was no centralization in its control. In order to facilitate the system effectively, the government has created a universal phone number 999. The main role of the MECC is to coordinate and provide high quality services to victims during emergency cases with a focus on advanced care. The components of Malaysia's EMS are not very different from those in the developed countries in the West. However, unlike in the US and some other developed countries where paramedics or emergency medical technicians are deployed, Malaysia utilizes registered nurses and assistant medical officers as the key health care providers.

There are few studies which measured the response time and these have failed to give an overview of the quality of pre-hospital EMS in Malaysia. For example, a small study in one city on the east coast of Malaysia revealed that the response time at the scene ranged from 15.2 minutes to 25.6 minutes (Nik Hisamuddin et al., 2007). In contrast, the minimum response time in a recent study focusing on out-of-hospital cardiac arrest cases was 14.75 minutes while the overall on-scene response time in Klang Valley was recorded to be approximately 20.83 minutes (activation and response time) at the horizontal level of a scene based on the data in the year 2011. In fact, the response time has not indicated a great difference from what was recorded in previous studies and it is far from the recommended time (Nurumal & Karim, 2015). This was indeed well below the time recommended by the National Highway Transport Safety Administration which is less than 8 minutes (NHTSA. 1997). Moreover, this formal service is newly developed and still in its infancy. The demands for this service will greatly increase particularly in urban areas, such as in the Klang Valley region, where more than 150 calls per day are received. As such, this present study is significantly important because dissatisfied stakeholders are raising the issues that relate to the betterment of the service (The Star, 24 February 2011).

Based on the gap highlighted in the issues of response time, this study therefore explored the response time phenomenon from the perspectives of health care provision and health care administrative who directly provide or are involved in the pre-hospital EMS care. The

qualitative descriptive approach was used to gain a full description of the phenomenon of interest. Sandelowski (2000) has explained that qualitative descriptive approach is an empirical method of inquiry that aims to explore and describe the key informants' perspectives, values and experiences in their world related to the phenomenon being studied. Moreover, this approach captures and imparts insiders' perspective by focusing on the practices that they experience, and provides a rich and genuine explanation of the phenomenon. Consequently, the rich information obtained from this naturalistic approach is considered as valuable information for the development of knowledge directly relevant to pre-hospital EMS practice, and enhanced understanding the topic of this inquiry.

### **Aims**

The study aimed to explore the phenomenon of response time in Klang Valley MECC by providing in-depth information on pre-hospital EMS from the perspectives of the health care providers and administrative members of staff with the hope of finding an answer to the issues of delay in response time faced by MECC.

## **METHODS**

A descriptive qualitative approach underpinned by naturalistic inquiry (Guba & Lincoln 1994) was undertaken in this study. This was adopted in order to gain legitimized perceptions based on the experiences of health care providers with regard to response time of pre-hospital EMS.

### **Participants**

In this study, various level of health care personnel participated in focus group discussion and semi-structured interview. The staff members consisted of many levels of category from the lower ranks up to higher level administrative officers. By profession, the participants were mainly drivers, nurses, assistant medical officers and emergency physicians; some of them were holding senior positions in their respective professions. Out of 25 participants, 13 of them participated in focus group discussion divided into two groups while the rest of the participants were key informants for the semi-structured interview. All of them were mostly recruited from the Klang Valley area and highly experienced in Emergency Medical Service. The inclusion criterion was that participants should have at least 3 years of experience in pre-hospital care EMS while the exclusion criterion applied to staff members who had three or more years of experience but had recently transferred to other disciplines or they had retired.

### **Ethical consideration**

The study had been approved by the Clinical Research Center of participating hospital, National Medical Research Register, and the Director of Medical Emergency Coordinator Centre of the participating hospitals. All participants were informed of the summary of the study and their right to withdraw from the study at any time before signing their consent form. They were also assured that their information would be kept confidential and anonymous.

## Data collection

All data collection were collected by the main author himself, who was the principal researcher, assisted by his colleague whenever help was required, such as arranging the place for focus group discussion and interview session, and identifying potential key informants. Each participant was given the cover letter and the consent form which must be read, understood and signed before focus group discussion and interview sessions were conducted. Prior to the recording, the researcher sought permission from the participants and explained the purpose of the recording, which was to aid the transcription of the conversation for analysis. The interview session with each participant took no longer than one hour unless participants were willing to share more or agreed to continue the interview session in the next appointment. As for focus group discussion, it was conducted approximately for 1 hour 30 minutes. Besides, semi structured interview, the researchers' team believe that using focus group discussion could contribute to dynamic communication among the participants and at the same time more ideas are shared. The principal researcher had ensured that the participants for both the interview and focus group discussion would only be interviewed after an appointment was made and in a convenient setting. The place where the interview sessions took place was the participant's room at the office while for the participants from the category of driver, it was left to them to decide their preference, e.g., at the cafeteria, on-call room or driver's administration office. The focus group discussion took place in the seminar room of the Trauma and Emergency Department.

There were 25 key informants altogether who participated in in this study, while 13 participants took part in two focus group discussions with eight and five members in each group respectively that comprised nurses and assistant medical officers. The principal researcher first had established good rapport and built positive relationship with the participants before conducting interview sessions, especially for the drivers, in order to obtain more meaningful data based on their experiences.. All focus group discussions and interview sessions were conducted in private, to protect the privacy of the informants' rights and to maintain confidentiality. The focus group discussions and interview sessions were carried out in either English or Malay, depending on the participants' language proficiency and preferences. The focus group discussions and interview sessions continued until it was decided that data had reached saturation point. Finally, an appreciation lunch for all the participants were organised as a token of appreciation for the assistance and cooperation they had given in this study.

The initial interview had revolved around questions from the semi structured interview and focus group discussions protocols. The questions include: "How is your experience with the performance in response time?", "What are the strategies that can be adopted in order to fulfill the required response time?" and particularly, "What types of complaints have you received from customers due to the delay in response time?". The participants were then asked to describe their experiences and how they dealt with the issue of delay in response time in order to extract the maximum amount of details from the participants' experiences in dealing issues related to pre-hospital care response time. Probing questions were also asked in between when the information given provided some essential answer to the research question in the present study.

## Data analysis

Data were processed after the focus group discussion and in-depth interviews were completed. Data were prepared and verified prior to analysis based on the research question. The

recording/MP3 files were transcribed verbatim as soon as possible after each of the focus group discussion and interview session was completed. Field notes and the principal researcher's reflexive journals were also read and cross checked with the transcription in order to ensure the researchers' understanding of the key informants' situations from their point of view. The verified technique was listening to the recorder/MP3 while reviewing the transcript word by word, capturing the pauses, laughs, and high-pitched expressions. The reading of transcript was repeated many times in order to gain insights into the participants' experiences, views and suggestions within their context and background. Brief stories regarding health care provision experiences in dealing with pre-hospital EMS response time were then written and reviewed to illuminate common response time phenomenon and experiences among the key informants. The description of demographic characteristics of participants was grouped and summarized. For this study, data collection and data analyses were conducted consecutively. The researcher did the analysis on his own and was closely guided by research team members.

To ensure quality data management and analysis, the researcher followed Graneheim and Lundman's (2004) content analysis approach which included the technique of 'coding', and emerging 'category'. The meaning units were condensed, and each condensed unit was abstracted and labeled with a code. The similarities and differences between the codes were compared and contrasted, and then sorted into categories according to the similarities between them. Iterative analysis was performed between the whole text, codes and categories. The final categories were validated through debriefing session with two experts in qualitative inquiry who are not the authors of this research.

### **Data trustworthiness**

Since this study applied a qualitative approach, rigor was maintained in order to ensure trustworthiness of the study. To establish rigor in qualitative research, Guba and Lincoln (1994) proposed the trustworthiness technique in support of rigor, characterized as follows: 1) credibility, 2) transferability, 3) dependability, and 4) conformability. Credibility was achieved when the researcher was recognized as valid by those who had that experience. In this study, the researcher conducted an interview at various levels by using person, recorder, interview guide, field notes and reflexive journal detailing the participants' insights into the issue of pre-hospital EMS response time. The researcher also sought verification of the interview summary after having transcribed verbatim from the entire group of participants while only four out of 13 participants in the focus group discussions had the opportunity to verify the transcribed verbatim content. Once the analysis was completed, the results of the study were given to five of the participants to validate the categories. Their feedback confirmed the credibility of findings of this study. Transferability refers to the probability that the findings of the study are meaningful to other similar situation. To ensure transferability, the researcher explained in detail the setting of the study, the sampling technique and the characteristics of the sample. Thus, the findings of this research study are possible to be generalized in the other MECCs in the Klang Valley area, particularly in terms of response time. Dependability is concerned with the appropriateness of the decision and methodology used. The researcher had ensured the in-depth interview and focus group transcripts were used to record the decision-making process. The research team members served as auditors, examining the process and product, i.e., the findings. Conformability means the degree to which the findings were determined by the participants and the context of the study, and not by the biases that came from the researcher.

## RESULTS

Table 1. Demographic Characteristics of Participant in Qualitative Study (N=25)

Characteristic	n (%)	Range
Gender		
Male	12 (48.0)	
Female	13 (52.0)	
Age (Years)		24 - 56
Experience in Trauma & Emergency (Years)		5 - 21
Job Position		
National Head of Emergency and Trauma Physician in Malaysia	1 (4.0)	
Senior Emergency Physician	1 (4.0)	
Emergency Physician	2 (8.0)	
Senior Head Nurse	2 (8.0)	
Senior Head Assistant Medical Officer	1 (4.0)	
Head Nurse	1 (4.0)	
Head Assistant Medical Officer	1 (4.0)	
Nurse	9 (36.0)	
Assistant Medical Officer	4 (16.0)	
Driver	3 (12.0)	

In this study, as shown in Table 1, various levels of health care personnel participated in the focus group discussions and semi-structured interview sessions. The members of staff consisted of many levels of category such as the lower ranks up to higher level administrative officers. By profession, they were mainly drivers, nurses, assistant medical officers and emergency physicians; some of whom were holding senior positions in their respective professions. Of the total 25 participants, 13 participated in two focus group discussions while the rest of the participants were key informants for the semi-structured interview sessions. All of them were recruited mainly from the Klang Valley area and were highly experienced in Emergency Medical Service.

### Category

From the qualitative data, a few categories emerged from the analysis with regard to response time performance issues. The on-scene response time in Klang Valley was approximately 20.83 minutes (activation and response time) at the horizontal level of a scene based on the data in the year 2011. Thus, on-scene response time was far from the standard time in global practice of less than 8 minutes. Every one of the key informants was aware of the importance of immediate response to each ambulance call. They shared their thoughts, experiences, and gave suggestions towards achieving the ideal response time as indicated in the international recommendation. Based on the information given, the issues of major concerns in the delay in response time could be summarized according to the following types:

#### *Insufficient key information*

Many of the key informants reported that address and landmark were among the causes of their delayed arrival at the scene. Every level of member of staff and officer did highlight

similar issues. Even with the satellite assistance that could be obtained directly from the system, there was still a need for clear instructions from verbal information guide to respond rapidly.

*Sometimes the information that comes to us is not correct. I think this is the only problem, incomplete information. We have to contact the call center again and the call center will call back the caller and after that, the call center will call us back to give the correct address....*

(Driver 3)

*We also have to remember that sometimes we cannot blame our ground level member of staff due to the late response. Another factor such as the caller not giving correct information, when the driver was about to drive the ambulance, only then they noticed that there was incomplete information. We often face this kind of problem.*

(Emergency Physician 2)

*...it is not that the response time is poor ....abbreviations create a lot of confusion for us... thus left us with incomplete information, and the landmarks are not clear... vandalism also gives us another headache in our search for the landmarks... just imagine, the signboards are damaged and you are under stress to make a decision which direction to take....*

(Nurse M, FGD 1)

In line with the above category, another category related to information emerged from the qualitative data analysis, which pointed to the possibility of causing the delay in responding to the victim. The category was as follows:

#### *Inconsistent information leading to delayed arrival of ambulance*

According to the key informants, Malaysians in general had too much concern for the needs of emergency ambulance without providing consistent information. For instance, they put an effort into calling for an ambulance after witnessing an emergency situation but they would leave the scene without giving clear information of the direction and the dispatcher could not proceed to be dispatched and had to wait for another caller which often resulted in inconsistent information received. The following excerpt describes this possibility category:

*They are good and really observant but they don't really act like that,... they called for an ambulance after seeing or witnessing an incident and often provided inaccurate information, when we called back, they often said, "I had already left, I can't remember the other landmark", and kept repeating the information given earlier... the problem is when unexpected situations occur in public, we will receive many calls for the same case... and this gives us headache, which caller, information, to trust... one simple example, Sultan Ahmad Samad Road is about 17 km stretch and they do not mention roughly which km, or heading from the north to the south or from the south to the north....*

(Nurse Q, FGD 2)

*I just have to spend so much time before dispatching members of staff because information is not consistent from the caller and sometimes we have to dispatch them and provide information to them while the ambulance is on the way.*

(AMO F, FGD 2)



*If communication is out then the response is always going to be poor. This is the main problem that we often face. For example, a member of the public gave a call and informed that there was an accident at Sultan Ismail Road without giving a major landmark for us. Everyone knows Sultan Ismail Road is very long. It could not be helped because the caller could not identify whether the incident happened on the north side or the south side of the road. We had to wait for another call or our MECC would call traffic police for confirmation. Again members of the public often used the traffic lights as a landmark, yet they are too many traffic lights on Sultan Ismail Road.*

(Driver 1)

#### *Traffic condition causing delay in ambulance speed*

The researcher created the above category because informants had mentioned that the roads in every part in the Klang valley were challenging for the driver of the ambulance to accelerate the speed of the vehicle during an emergency. This was due to the behavior of other drivers who did not cooperate to clear the emergency lane for the ambulance because they panicked upon hearing the sound of the siren. The informants described that the challenges from the start of the journey inside the hospital compound through the highway, split roads and town roads came from the traffic, the behavior of other drivers on the road, one-way road system and having to drive a long distance before being able to make a U-turn. This made it difficult for the driver of the ambulance to accelerate the speed and indirectly increased the response time.

*....Inside the hospital, it also takes a lot of time. It can be 3 minutes, it may also be 5 minutes, sometimes.... Sometimes I will take my own risk.... There is no other choice. I have to settle this problem by myself. So what I would do is I use a shortcut, or I would drive against the one-way route... the U-turn is too far away, it may be up to 3 to 5km.*

(Driver 2)

*Our members of the public usually panic or get distressed easily when they see an ambulance with the siren on, they don't make way for the ambulance to pass by especially during peak hours. And we don't have a good system in Kuala Lumpur where there is a separate lane for emergency use at all the roads except for the highway.... We don't have a special lane.... And this impedes our response time.*

(Senior Head Nurse 1)

*Just imagine parking at a residential area could also obstruct our way to pass through to get to the location. We are aware that parking is a problem in a big city like KL but people should also think how to handle this if there is an emergency... sometimes you could see cars being parked on both sides of the road in the residential areas like the flat... there can only be one-way traffic at a time... that is the reason we always prefer a small ambulance (Toyota) and not the big one.*

(Nurse A, FGD 2)

*For example, when we are stuck at the traffic lights with a red light and there are members of the public there with us as well, they don't know what they should do. What should happen is the one with a green light should stop and make way for us. At the moment, the one with the green light doesn't stop and the one with the red light which is blocking our way doesn't try to move. So knowledge and awareness of members of the public on what to do when the ambulance is behind them is one of the factors that cause delay in the response time.*

(National Head of Trauma & Emergency, MOH)



### *Lack of resources contributing to increase in workload*

Most of the senior level officers and national heads of emergency and trauma departments realized that lack of manpower and ambulance were another cause for not achieving the ideal response time. Interestingly, the drivers and focus group members did also highlight the similar issues of work burden due the limited resource. Another possible reason that was also being stressed is when they outsourced the ambulance from other MECCs. This may also be another factor that led to late arrival at the scene. This happened as a result of an increase in call volume.

*.... Most of the nurses are doing double duty. By the time they go out, there is no one to replace them immediately, so there is possibly time drag for ambulance case if it happens during the changing of the shift.... Why is there lack of human resources? ...this is because when we started the MECC, there was no manpower. We shared the pool of staff within the department. So, we have to make do with what we have....*

(Senior Head Nurse 2)

*....We talked about the actual number of ambulances required in the Klang Valley. If you take the normal requirement, which is based on the workload, so on and so forth, we actually have 40% of what is normally required, because in the Klang Valley, in total, we have about 20 ambulances. But the actual number required is around 60 in Klang Valley, so in order to avoid, you can't get an ambulance like buying fruits at the grocery store. That is why it takes a while.*

(Senior Emergency Physician)

*.....In the past, we had 3 teams, now we have increased to 5 teams in each shift due to an increase in demand. Sometimes, some of the team members have to go on standby at national events and the remaining team members have to do frequent calls and it is very tiring having to out again after coming back... sometimes, we have to go to the toilet or have a sip of water and because of fatigue, our driver sometimes cannot perform or think which easier road to take... so, this is one of the possibilities for late arrivals.*

(AMO F, FGD 2)

### *Unassertiveness in the attitude of members of staff*

It has been discussed during the interview with both groups of the administrative and ambulance personnel that some of the members of staff did not have proper attitude in accomplishing the task given during ambulance call duty. It was mentioned that if one of them was not there when the call came in, this would lead to the consequences of interruption in the dispatch time of the ambulance which may include the driver being uncertain of the right direction to the place where the incident had occurred.

*...We also aware sometimes that our responder team members are not moving fast when there is an emergency case. It is all about their attitudes but this is can be monitored from our CCTV. It is hoped that they will be more alert because recently we had direct view of their movement in the ambulance from the response room. We also can see the run sheet when we have an audit from time to time.*

(Emergency Physician 3)

*....I know some of my colleagues are too much focused on their stomach rather than the needs of society. They are always away from their station and go for a meal or a drink. Some of them always will go to the toilet before going inside the ambulance*

*and the driver is not assertive to learn the road system or the shortcuts. This is especially true for new drivers.*

(Nurse S, FGD 1)

### *Strategies to reduce the response time*

Some of the respondents shared their thoughts of possible ways to reduce the response time or to improve past and current performance. Interestingly, many of them clearly explained that members of the public needed to be exposed to the entire process of an emergency medical service system in Malaysia and not only be provided with information on how to get access. This was thought to be partly the reason why members of the public could not communicate well and provide correct information when they sought for the service. On top of that, the participants also highlighted the roles of members of staff and other strategies such as locating ambulance in the hotspot areas so that immediate access would be possible.

*....I think we need to educate many levels of people that deal directly with the EMS service, [from] the call taker to ensure that all information is clear before passing it to the dispatcher and [to] the dispatcher who has to pass a clear message and start working closely with the responder. The same goes to the caller who needs to give the right information so that the process can run smoothly and directly which will expedite the response time. Again, we need to have a sense of responsibility when the task is given. It should be remembered that it all counts as a form of [good deed that can be regarded as an act of] worship [to God].*

(Emergency Physician 2)

*Our current strategies... and these are approved at department level, that we are now allowed to park our ambulance in the common accident area during peak hours normally in the early morning and after 4.30 p.m.until 8.30 p.m. In the KL area, we have identified two places, one is in Mahameru and the other one is in Titiwangsa, because these two places can cover the North-South motorway during peak hours. Another place that we ask our counterparts from PPUM to cover is the Bangsar area... These are the current strategies. We hope this could improve our performance as shortening the zoning coverage.*

(Head AMO)

*...The driver needs to take an initiative to become familiar with all the roads, the system and directions in the Klang Valley area and if possible, discover shortcuts... and also the driver needs to be very skillful....*

(Nurse S, FGD 2)

*...If during a real OHCA case is being identified and we need a motorbike especially during peak hours, we hope policy makers can overcome previous issues and introduce back motorbike ambulance.*

(Head AMO)

## DISCUSSION

Response time performance is the main interest in EMS system to ensure that performance is properly measured. International practice describes that the main concern is the on-screen response time which should be less than 8 minutes from time of dispatch to time of arrival at the scene to shorten the time sensitivity for life threatening cases. Due to many arising issues

with regard to on-scene response time, a qualitative study was conducted to study this phenomenon. Many countries have difficulties in achieving the target recommended time. As a result, every country has its own target time (Health Information and Quality Authority, 2010). For example, in Malaysia, its MECC from year 2008 until 2011 had recorded 90% of the cases of on-scene response time to be 30 minutes whereas from 2012 to the present, it has been recorded that 90% of the cases of on-scene response time are 20 minutes, inclusive of activation time (3 minutes) and transport time (20 minutes). Certainly, these statistics provided a justification for exploring the real problem and challenges faced by MECC with regard to on-scene time response. The time has come for Malaysia EMS policy makers to consider reviewing the key performance indicators for the response time intervals and provide the strategies to achieve the global standard response time. If strategic action is planned and implemented based on qualitative findings, there will be a positive direction for future improvement of on-scene response time in Klang Valley, MECC. Based on the emerging category from the analysis of the qualitative data from this study, there should be room and opportunities for improvement in the future to manage patients' illnesses in the context of pre-hospital care and according to the needs and demands of the society.

It is important to keep the notion that an appropriate recommended response time is required to be maintained as short as possible all the time because there is a need to shorten the time sensitivity of certain life-threatening diseases. Many studies have examined the lack of association between response time and patient outcomes (Blackwell et al, 2009; Newgard et al, 2010 & Al-Shaqsi, 2010). Even though these studies have also indicated no statistical significance, clinically it has been shown to have an impact on the society. For example, in Malaysia, the mean "door-to-needle" time shown in the recent local study was about 105 minutes for acute myocardial infarction (Chew et al, 2008). Hence, all efforts should be made to shorten the total ischemic time and good prognosis can be expected.

Moreover, response time has been used extensively in defining pre-hospital emergency medical service performance. Nevertheless, our findings were unable to reaffirm the findings of other studies. This is because there were no qualitative findings reported on response time issues or challenges as many studies have only assumed the delay by mentioning traffic as a major cause of delay with regard to this phenomenon. Hence, there is a grave concern for the notion of response time as the target of pre-hospital care performance. However, the safety issues of the ambulance speed need to be cautiously considered. The financial implications of having personnel and ambulance available in every hot spot location as well as cooperation from other agencies such as the traffic police and the fire department is also needed to improve the rapidness of the response. Above all, educating the society is also one of the most crucial elements to ensure that the service can be delivered safely, economically, effectively and rapidly with the cooperation from all parties involved.

The Ministry of Health (MOH) needs to play important roles in ensuring that all the policies, protocols, guidelines and national quality indicators are up to date and safe to be practised by each of the MECCs. Integrating and networking with other agencies is of paramount importance to ensure the MECCs are run smoothly. Among the agencies that the MOH needs to work with closely are the Ministry of Communications, Ministry of Work and Roads, and non-governmental organizations.

At present the public is only aware of getting access to the ambulance service during emergencies. This is because the mass media, through the Ministry of Communication, has educated the public to this end. However, the public is not aware of the entire process involved and how the EMS functions. Dissatisfaction is caused when the call center is inquiring about more information and provides advice to the caller. In order to overcome this, the MOH

with the collaboration with the Ministry of Communication needs to use mass media to educate the public. This could be done through a public television channel to deal with the entire process of EMS, including 'post-dispatch instruction' and 'pre-arrival instruction'. For example, dealing with how to conduct CPR by telephone instruction or how to keep the victim safe in a life-threatening environment. Providing information on the complete process of EMS could bring benefits. This will be in terms of getting access and receiving information and advice. It could provide details about action or care to be taken while awaiting the ambulance and should open the public's eyes and make them more co-operative as well as create the awareness on the process of the seeking EMS.

The MOH also needs to provide suggestions to the Ministry of Work and Road on how to handle the road system in the Klang Valley context. This is needed especially along highways where it is always challenging for ambulances to make U-turns because of the distance from one exit to another. In addition, there is also a need to make an extra lane for ambulances especially in the city roads. This lane could be used when not required by ambulances. However, when the use of sirens is on, everyone should vacate the lane to allow only ambulances to pass through. This could also be done by educating the public through a television channel.

Non-governmental organizations can be important assets to the MOH as a source of additional support when there is a crisis or a shortage of ambulances. Thus, a clear memorandum of understanding between the MOH and agencies need to take place so that any MECC that faces a shortage of ambulances could get assistance without further burdensome bureaucratic processes. This is because at present Malaysia is still struggling to fulfil the ratio of 1 ambulance to 80 000 of the population.

It has also been highlighted that the MOH needs to consider the end user's view before purchasing any devices, equipment and vehicles. It is important to understand their perspectives for analyzing is the quality of products. Furthermore, the MOH has to ensure that all products purchased has access to spare parts and efficient and timely maintenance. Finally, the MOH needs to provide a national EMS information system database. This will enable all MECCs to enter their pre-hospital care key performance indicators for comparing past and present progress so that strategic planning can be undertaken. This will be the baseline for the MOH to monitor quality of performance at the national level and improvement can take place.

MECC roles as a center of excellence. To become centers of excellence each MECC has to play assertive roles to reach world class levels. They should be reference centers for other internal or external EMS agencies too. Guaranteeing excellent performance, it is the responsibility of each MECC to have clear administration organization charts. These must cover each level of administrative personnel responsible for ensuring all the processes of the EMS system so that these run effectively and cover all aspects of the structure, process and outcomes components. This way the MECC can constantly develop quality management, risk management, public education, and research activities. This management strategy will ensure that the quality assurance and performance measure are intact and in line with the desired key performance indicators.

Quality management in every MECC is required to ensure the receiving of continuous feedback regarding the effectiveness of an EMS system in place. Quality management will allow medical supervisors to modify clinical protocols, modify in-house professional development programs for staff centered approaches, and modify the existing system design more effectively. This could be based partly on suggestions from staff on the ground and

general feedback or complaints. This is because, as mentioned earlier operational procedures are a key to improving outcomes.

A pre-hospital context could carry many possible hazards and dangers for both staff and victims. Therefore, an appropriate risk management approach must be built into the character of each MECC. In general, comprehensive processes are needed for the identification, management and resolution of medically-related events that may affect the safety of patients and staff. This is important in public environments where there are risks and exposure to danger. Consequently, steps are required such as reporting, documenting, and investigating to resolve the risks associated with such events. This risk management approach has to be a stand-alone approach in order to sustain the operation. Standards for protocols for preventative measures will be required to guide everyone involved, particularly personnel at the ground level. For instance, vehicle inspection and maintenance guidelines must be strictly adhered to. Consequently, activities such training, accreditation, supervision, documentation, audit and patient or customer satisfactions are obligatory to maintain the high performance of an EMS.

The concept of public education is not only limited to the MOH to provide education through the mass media or local television. Each MECC also has to continue to provide education and give the opportunity to the public to practice hands-on activities. For instance, each MECC should mount road shows and provide EMS education at every level. This should involve school-based, family-based and community-based approaches about the entire pre-hospital EMS process. In addition, MECCs could actively participate in any local event or exposition to promote EMS education, or mount seasonal campaigns to give the public updated knowledge and practices.

Many of the issues confronting the EMS deal with the community. This study has shown that the public is not giving good co-operation. For example, an important role is advocated for involving bystanders in CPR, CPR training, public access to defibrillation and also first aid. Public education also needs to emphasize their role and the importance of injury prevention, public awareness and how to recognize acute heart attacks, strokes or other illnesses that are time sensitive. For instance, the public should be empowered from the school when they are young; if the training commences from school age, they will be well prepared. This is essential knowledge for them when witnessing any unwanted medical event. At the same time, they also have to be educated about driving and parking behaviour too; these are issues that cause difficulty to Klang Valley MECC ambulances.

When providing service it is vital that pre-hospital care personnel have excellent knowledge and skill, both in communication and intervention. They should also have responsible attitudes towards delivering the service with a highly professional manner. They are also responsible for adhering to all the protocols, including ambulance regulations, and every decision beyond their scope needs to be approved at the medical direction level. In providing services, they also need to avoid any carelessness with regards to handling equipment and supplies as well as the condition of ambulances. They should always actively participate in skill development education and using improved technology. They also need to discuss any difficulty or challenge that they face when providing pre-hospital service with their superiors so that any necessary action can be taken to address the issues. Eventually, all the activities carried out need to be well documented, using the pre-hospital care sheets, for future evaluation and research activities of the MECC.

Awards and recognition are important to maintain and sustain achievements in pre-hospital EMS. These are needed to motivate both the health care provider and the team, including the

public, who have demonstrated excellent responsibility in preserving a victim's life when seeking pre-hospital care. The MECC has to make this known to the public (through public television news and local newspapers) so that everyone will be enthusiastic about caring in the society. The reward will be always be something for them to share or continue to do so for the betterment of the society.

### **Limitation of the study**

The response time phenomenon in Klang Valley has been described in this study. The findings may not be applicable to all MECCs in Malaysia or EMS providers in other countries. Thus, the findings of the present study need to be interpreted cautiously.

### **Implication for practice and research**

The findings of the present study have led to implications for practice and research in EMS system. Firstly, pre-hospital care providers can use basic and essential information from this study to improve their existing system including educating their health care personnel. Secondly, educational and awareness programmes on how to seek EMS service should be planned and organized for members of the public. Finally, further research is necessary to examine the improvement of response time performance after action plan has been implemented as well as the satisfaction of the society and good patient outcome.

## **CONCLUSION**

This study has highlighted the response time issues and challenges encountered by Klang Valley MECC. All the key informants shared their thoughts, experiences, and suggestions towards achieving the ideal response time according to international recommendations. Based on the information given, most of the issues that led to delayed response time were 'insufficient key information', 'irresponsible callers leading to confusing information', 'traffic condition causing delay of ambulance speeds', 'lack of resources contributing to increase in workload', and 'unassertiveness in attitude of members of staff'. These findings contribute to add more insights into and understanding of knowledge on EMS providers in accommodating clients' needs. Policy makers should use the knowledge generated by this study to improve the EMS system more efficiently.

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