

Paramedics beliefs and attitudes towards pre-hospital thrombolysis

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ABSTRACT

Background: Myocardial infarction is the third leading cause of death in the developing countries. Thrombolysis as a reperfusion therapy is shown to have a great role in decreasing mortality. The efficacy of thrombolytic therapy lies in its ability to reduce the duration of occlusion by early administration. Many of the studies have supported pre-hospital thrombolysis (PHT) therapy and proven that it is beneficial in acute myocardial infarction (AMI) patients. **Methodology:** Questionnaires adopted from studies of Humphrey *et al.*, were distributed to paramedics in Saudi Red Crescent Authority and Emergency Medical Services Departments at King Abdulaziz Medical City, King Fahad Medical City, Prince Sultan Medical Military City and Security Forces Hospital in Riyadh. A total of 7 questions were about the knowledge of risk and benefit of PHT and 12 questions were about the beliefs and attitudes of paramedics toward PHT in AMI patients. **Results:** The response rate was 87%. Nearly 72% were believed to be capable of performing PHT, 87% are confident about recording 12-lead electrocardiogram in pre-hospital settings and 77% are confident in the interpretation. 94% believe that PHT will have a significant impact on pain to needle time. 77% consider PHT to be safe for use by paramedics. 66% preferred on-line medical direction or telemedicine linked with the supervision of a physician. Regarding the knowledge part, majority gave a correct answer, but the major concern was that 43% of the paramedics overestimated direct relation of bleeding to thrombolysis therapy. **Conclusion:** Majority of paramedics in Riyadh support the principle of PHT in patients with AMI via online medical direction. They believe that they are confident in their ability to administer PHT despite the concern of authorities on their level of training, the related risks and medico-legal issues. Nevertheless, since the total duration of PHT course for paramedics is just 2 days, we consider that the procedure should be performed under expert supervision until they achieve expertise.

Key words: Acute myocardial infarction, attitudes, beliefs, paramedics, pre-hospital thrombolysis, questionnaire

INTRODUCTION

Myocardial infarction (MI) is the leading cause of death in developed countries and the third leading cause of mortality in developing countries.^[1] It is the most common presentation

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of ischemic heart disease (IHD). In a report on IHD, World Health Organization^[2] estimated that the world-wide deaths from IHD were 12.6%. Thrombolysis as a reperfusion therapy in acute myocardial infarction (AMI) has shown to have a great role in decreasing both in-hospital and long-term mortality rates.^[3] The efficacy of thrombolytic therapy lies in its ability to reduce the duration of occlusion by early administration after the onset of symptoms to limit the infarct size.^[4] From the first use of thrombolytic therapy by Fletcher in 1958^[5] and the beginning of trials in early 1970s and 1980s,^[5] many studies have shown and proven the time-relation between the early administration of thrombolysis therapy after the onset of symptoms and the reduction in mortality rate in AMI.^[6]

Literature reports have shown that 35 out of 1000 patients with MI were saved when thrombolysis therapy is administered within the 1st h of the onset of symptoms

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compared with 16 out of 1000 patients were saved when therapy was administered 7-12 h of the onset of symptoms.^[6] Thrombolysis therapy was being administered exclusively in the coronary care unit, but the time-relation necessitated this treatment to be transferred to the emergency department. This transition of thrombolytic therapy resulted in saving time by the early administration of the thrombolytic agents after the onset of symptoms in MI patients as well as in lowering the mortality rate.^[7,8] In response to this transition of care and the time-relation, many health-care systems have transferred the thrombolytic therapy to the pre-hospital phase. Many studies have proven and supported pre-hospital thrombolysis (PHT) because WMS have a critical role in the early recognition and the management of AMI patients. Partial thromboplastin time will help in changing the window of thrombolytic agents administration from 30 min "door to the needle" to 60 min "call to needle," which some studies have already proven that "call to needle" increases the proportion of patients receiving thrombolytic agents in AMI.^[9] Health Care Commission^[10] reported that pre-PHT for AMI significantly decreases the time to thrombolysis and reduce mortality.

The application of the amended Joint Royal Colleges Ambulance Liaison Committee (JRCALC) 2006 guidelines for paramedic-initiated thrombolysis has successfully increased the proportion of patients suitable for PHT by approximately 10%.^[11] Moreover, the European MI project group concluded that "PHT for patients with suspected MI is both feasible and safe when administered by well-equipped and well-trained mobile emergency medical staff."^[12] Hanson and Williamson^[8] showed a median time saving of 71 min with PHT. In addition, the authors also reported that thrombolysis delivered by paramedics with support from the base hospital can meet the national

targets for early thrombolysis. The role of emergency departments toward thrombolytic therapy in AMI after the introduction of PHT by the amended JRCALC criteria for thrombolysis was interrogated.^[13-15] Assessing the paramedics confidence about their beliefs, attitudes and knowledge about the risk and the benefits of thrombolysis therapy is essential before attempting any studies regarding any new intervention, protocol or training courses. The present study was conducted in view of the fact that the available literature suggested a paucity of definite investigations to analyze the beliefs and the attitudes of paramedics toward PHT in Saudi Arabia

METHODOLOGY

All the emergency medical services (EMS) providers working as paramedic or advanced emergency medical technician (A-EMT) in all specified hospitals and Saudi

Red Crescent Authority (SRCA) at Riyadh Saudi Arabia were the subjects of study. The study design included a cross-sectional study. The questionnaire instrument adopted from Humphrey *et al.*^[1] was provided to the participants. A minimum of 6 months working experience has been the inclusion criteria for all the respondents working in EMS as paramedics and A-EMT in the specified centers. SRCA, EMS Departments in King Abdulaziz Medical City, King Fahad Medical City, Prince Sultan Medical Military city, Security Forces Hospital, at Riyadh Saudi Arabia became the setting of the study. Out of 150 paramedics, a total of 131 paramedics were selected as respondents.

RESULTS

The results were obtained on the assessment of beliefs and the attitude of the paramedics toward PHT showed that a majority (72%) of paramedics believe that they are capable of performing PHT, 87% are confident in recording 12-lead electrocardiogram (ECG) in the pre-hospital settings and 77% are confident in their interpretation of 12-lead ECG [Table I and Figure 1]. A high proportion (94%) believes that PHT will have significant time saving from the start of the chest pain until the administration of thrombolytic agents.

When questioned about the future role of the paramedics toward PHT, majority (66%) preferred online medical oversight linked with physician authorizing the PHT, 24% preferred autonomous diagnosis and administration of PHT by the paramedics and only 10% preferred transportation of MI patients without PHT. Furthermore, when asked about the frequency of paramedics seeing the patients with suspected cardiac chest pain, the majority (45%) believed they will see one patient per shift in comparison to non-cardiac chest pain.

The results on the knowledge of risk and benefit of thrombolysis therapy showed that a majority (45%) of the paramedics responded with correct answers on the number of lives saved, if thrombolysis was given to AMI patients in the 1st h after the onset of the symptoms while 44% respondents overestimated. On delaying the time by 4-12 h, majority (60%) gave the correct answer.

On direct relation of death risk to thrombolysis, 53% gave the correct answers, while 45% overestimated. The relation of bleeds to thrombolysis therapy was overestimated by 43% of the respondents.

DISCUSSION

The questionnaire to assess the beliefs and the attitude of paramedics toward PHT was adopted from Humphrey *et al.*,^[1]

Table 1: Response of paramedics

Questionnaire	Correct answer (%)	Overestimate (%)	Underestimate (%)
Treatment of acute myocardial infarction			
What is the overall risk of death in untreated AMI?	38	54	8
How many lives are saved giving aspirin in AMI?	37	24	39
How many lives are saved if thrombolysis is given in the first 1 h?	44	11	45
Between 4 and 12 h?	60	37	3
Risks of thrombolysis therapy			
Extra deaths are directly related to thrombolysis	53	34	13
Extra strokes are directly related to thrombolysis	12	43	45
Extra major bleeds, (ex cerebrovascular accident (CVA)) are directly related to thrombolysis	39	43	18
What is the future role of paramedics in managing patients with suspected AMI?	Autonomous diagnosis and paramedic administration of PHT %	Telemedicine link to hospital-advise to administer PHT %	Transport to hospital with no PHT %
	24	66	10
Where should training for thrombolysis take place?	Hospital %	Pre-hospital %	Training school %
	71	23	6
Do you	Yes (%)	No (%)	
Believe PHT will have any significant saving in pain to needle time?	94	6	
Believe PHT is safe for use by paramedics?	77	23	
Think you will see enough patients with AMI to feel confident to give PHT?	67	33	
Feel this skill should attract a pay increase?	67	33	
Think training should be recognized by a National CPD Certificate?	84	16	
Questionnaire	Agree/strongly agree %	Natural %	Disagree/strongly disagree %
I think paramedics are capable of performing PHT	72	24	4
I would feel confident to record a 12 lead ECG in the pre-hospital setting	87	12	1
I would feel confident in my interpretation of a 12-lead ECG	77	21	2

AMI: Acute myocardial infarction; CVA: Cerebrovascular accident; PHT: Pre hospital thrombolysis; CPD: Continuing professional development; ECG: Electrocardiogram

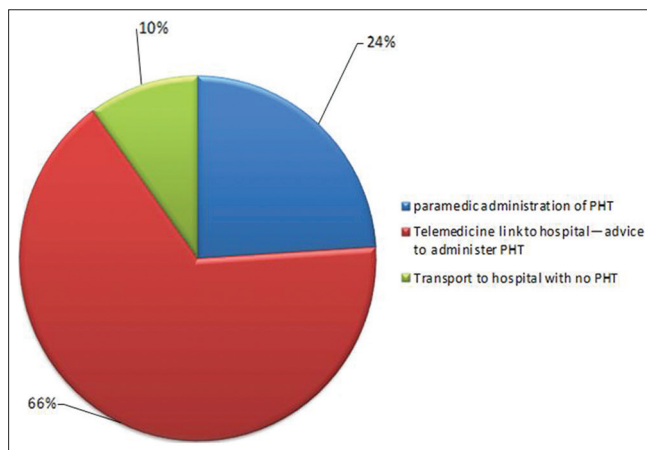


Figure 1: The future role of paramedics in managing patient with acute myocardial infarction, Blue Block: Paramedic administration of PHT, Red Block: Telemedicine link to hospital—advise to administer PHT, Green Block: Transport to hospital with no PHT

and served to all the qualified EMS personnel working as paramedics and A-EMT in the specified centers of Riyadh. The first part of this study assessed the paramedic beliefs about the ability and the safety toward PHT. Majority of the paramedics supported and believed that they are capable of performing PHT and that the therapy is safe to be use by them. This observation supports the previous studies, which have proved PHT to be both feasible and safe when administered

by well-trained paramedics.^[12] Nevertheless, majority of paramedics in Riyadh support the principle of PHT in patients with an AMI through online medical direction. They believe that they are confident in their ability to administer PHT despite the concern of authorities on their level of training, the related risks and medico-legal issues. Nonetheless, the authorities in the present set up are skeptical on their level of training and confidence. Since the total duration of PHT course for paramedics is just 2 days, we consider that the procedure should be performed under expert supervision until they achieve expertise.

The administration of PHT precedes thrombolysis, however; the checklist of exclusion and inclusion criteria is to be followed to save time by excluding patients, who suffered trauma, had surgery in the recent past and/or are on warfarin treatment. Literature reports confirm that the main cause, which prevents the paramedics from administering PHT is the unsuitable condition of the patient.^[7]

Monitoring 12-lead ECG recordings are the accepted requirement for pre-hospital data acquisition in patients with MI. However, it is a well-known fact that some EMS personnel have problems in recording and/or interpreting 12-lead ECG in the pre-hospital settings. In a recent study, Figgis *et al.*,^[16]

showed concern on the use of 12-lead ECG, the authors opined that further provision of training is necessary to enable paramedics to more accurately assess and treat patients with acute coronary syndromes. On a question about the ability of the respondents to record and interpret 12-lead ECG, majority responded their confidence. There are varying reports on the expertise of paramedics in performing 12-lead ECG. However in a similar survey conducted by Mississippi State Department of Health, the Bureau of EMS, reported that of the 49 paramedic ground services, 35 routinely use 12-lead ECG with efficiency.^[17]

On the numeral of the MI patients, the question framed was to know, if there are enough number of MI patients who meet the criteria of PHT in Riyadh. The benefit of thrombolysis is maximal during the first 2 h after symptom onset hence the response of the majority was "yes." This was perhaps due to lack of 24 h catheterization laboratories and their uneven distribution which may make the patient's time of transportation exceed the "door to balloon" window (90 min) against approved guidelines for not exceeding 90 min.^[1] The Canadian Emergency Cardiac Care Coalition, the American Heart Association and similar groups have established a benchmark for the administration of thrombolytics in AMI care as a door to needle time of 30 min or less.^[18] However, this limit is difficult to be followed in most of the cases. Especially, in some areas, due to the absence of emergency departments with thrombolytic agents, the transportation time exceed the "door to needle" window. Chest pain is often an indicator of a heart attack. Even if it is not that serious, just the thought of it will require some expertise and sophisticated equipment. This is one of a few medical complaints that need emergency medical care. On an interrogation as to how many chest pain cases a paramedic can manage, majority of the respondents answered 1 per shift on an average. Nevertheless, this estimation is underestimated. In a study on safety and effectiveness of practice of rural EMT, Haynes and Pritting reported 41 min as the mean time to traditional advanced life support care at EMS.^[19]

The thrombolytic agents used in the PHT are shown to decrease mortality. There are several thrombolytic agents that differ in cost, antigenicity and currently more investigations are being directed to find safer and more effective thrombolytic agents. Nevertheless, the thrombolytic agents are associated with hypotension, arrhythmias and hemorrhagic complications,^[20] which might be a risk of intracranial bleeding and many more systemic or major bleeding risks and death. It was interesting to find the knowledge of paramedics regarding the risks of thrombolysis therapy. When questioned, if additional deaths were directly related to thrombolysis, majority of the respondents provided the correct answer, while few underestimated. About the risk of hemorrhagic stroke with

thrombolysis therapy also majority of the respondents provided the correct answer, while a sizeable number of paramedics overestimated. The differed opinion of the paramedics might be a cause of the biased view of risks for the PHT.

Notwithstanding the patients satisfying the inclusion criteria for the thrombolytic agents and medical history related with any bleeding or trauma, there are instances when the thrombolysis therapy is associated with bleeding. On an interrogation about thrombolysis linked bleeding, the respondents were positive, with substantial overestimation. In a recent report, it has been shown that bleeding is the main complication associated with thrombolytic therapy for MI.^[21] Although most of bleeding occur at sites of vascular access and is mild, in some cases gastrointestinal, retroperitoneal, genitourinary, lung and central nervous system bleeding may occur. These episodes are usually serious and sometimes fatal. The authors described the case of a patient who received thrombolytic therapy with streptokinase as a treatment for MI and subsequently developed an acute respiratory failure, bilateral pulmonary infiltrates and fall of hematocrit compatible with diagnosis of alveolar hemorrhage.

Thrombolytic therapy has been a major advance in the management of AMI. Nevertheless, it continues to be underused or is administered later than is optimal. The questionnaire included an interrogation about the benefit of thrombolysis therapy in AMI patients by enquiring the survival rate, if the treatment is given in the 1st h in AMI patients. Such questions were assessed the idea of the time relation effect on the mortality rates, which if the time of the administration of thrombolysis therapy is directly proportional to the mortality rates or not and the majority of the paramedics replied with correct answer, while a few underestimated. When asked if the thrombolysis is delayed to 4-12 h how many AMI patients are saved, the majority provided the correct answer. Literature reports suggest that the extent of benefit from thrombolysis depends on the delay between symptom onset and administration of thrombolytic therapy. In International Study of Infarct Survival (ISIS-2), collaborative group, patients randomized between 0-4, 5-12 and 13-24 h after the onset of pain had a 35%, 16% and 21% reduction in vascular death, respectively (ISIS-2 collaborative group, 1988).^[22]

Although the results showed that the majority of the paramedics support the PHT and have fair knowledge about the risk and the benefit of thrombolysis therapy, training courses are mandatory to increase the awareness and test the knowledge as well as the practical skills of the paramedics to deliver PHT before any trials or to apply any protocols. In a study on a similar questionnaire conducted on paramedics in West Yorkshire Metropolitan Ambulance Service, the respondents

supported that concerns about the risks of thrombolytic treatment, training and the medico-legal implications.^[1]

Limitations of pre-hospital thrombolysis

Notwithstanding the significance of PHT to reduce morbidity and mortality related with AMI and the comorbidities, there are always some limitations that are challenges. (i) The link between the hospitals and EMS is weak (ii) there is dearth of unified system concerning the patient information and a paucity of defined policies and rules for patient eligibility (iii) there is a shortage of unified telemedicine helping the paramedic to contact the nearest center, which can guide on administering the PHT or transport the patient to catheterization laboratories (iv) there is no National Saudi Registry of EMS personnel, which ensure professional responsibilities to adapt new protocols or implement any new courses (v) pre-hospital delay, financial constraints and lack of infrastructure are the main barriers of thrombolysis therapy in developing countries (vi) lack of confidence of the authorities on the training and skills of the paramedics, which might involve medico-legal issues.

CONCLUSION

Based on the limitations it can be concluded that the majority of paramedics in Riyadh support the principle of PHT in AMI patients and are confident in their ability of the administration and the safety of PHT. However, they favor that it to be performed through online medical direction under supervision of an expert physician. Since the total duration of PHT course for paramedics is just 2 days, we consider that the procedure should be performed under expert supervision until they achieve expertise.

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