

## CHAPTER 5

### Summary, limitations and recommendations

#### 5.1 INTRODUCTION

The previous chapters illustrated how the research study idea was conceived, described the comprehensive literature search undertaken and discussed how the study was conducted.

The research instrument was utilized to gather the vital data by the researcher and the information was protected by a secret password to which only the researcher had access. The data was processed with the assistance of the statistical package SAS 9.1 and with the assistance of a professional statistician (see chapter 4).

This chapter is concerned with making recommendations for future research, discussing limitations and fulfilling the final objective of reducing the door-to-needle time.

#### 5.2 SUMMARY

##### 5.2.1 The research process

According to the literature reviewed, myocardial infarction is fast becoming a global and social issue with devastating effects, contributing to increasing mortality and morbidity rates. Mortality is correlated with time lapsed between the onset of symptoms and the reperfusion of the myocardium, whether surgical intervention or thrombolytic therapy. Hospitals, however, can only offer patients thrombolysis as a means of reperfusion therapy, and it is in these areas that time delays must be reduced in an attempt to offer the patient the best chance of survival after AMI.

Thrombolytic therapy is the effective pharmacological agent used to reperfuse the infarcted myocardium, along with the adjunctive therapy in the absence of surgical interventions. In fact, it is considered the safe substitute for surgical interventions.

Surgical interventions have been declared superior to thrombolytic therapy owing to the TIMI grade 3 flow rate observed in studies at 60-90 minutes after the intervention. Although superior and effective, the use in many developed countries has not been sustained owing to the escalating costs related to percutaneous coronary interventions. Thrombolytic therapy has been chosen instead as it is considered an inexpensive and effective method of reperfusion, providing it is administered to the patient within the first two hours after symptom onset. The timeliness of the administration of thrombolytic therapy is a major determinant of the outcome of thrombolytic therapy, as the function of myocardium depends on the restoration of blood flow through the infarct-related artery, soon after symptom onset. According to numerous research reports, the maximum benefit of thrombolytic therapy can only be derived if the thrombolysis is commenced within the first one to two hours after the initial onset of symptoms. However, some doctors still offer the patient thrombolytic therapy after 12-24 hours if they think that the patient has a chance to survive. Nevertheless, late delivery of thrombolytic therapy can be fatal report researchers and cardiologists

The first hour has been termed the "golden hour" as at this stage the patient stands to derive the maximum benefit from thrombolytic therapy. The TIMI grade 3 flow rates have been observed at 90 minutes when administered within first 2 hours after onset of symptoms. As time elapses, it has been reported that the myocardial cells necrose within 15 minutes and in 40 minutes, almost 38,00% of the myocardial cells die and within 6 hours, 71,00% of cells die. In 24 hours, 85,00% of cells die with cardiac compromise and fatalities seen in patients arriving late for treatment. Thrombolytic therapy after this point is considered futile in the treatment of AMI. The NHAAP (1994:314) recommends a door-to-needle time of 30 minutes in an effort to reduce delays in reperfusion.

Prehospital delays are inevitably present in the majority of patients who present for treatment for AMI, therefore the urgency to treat within 30 minutes after arrival at hospital.

The overall aim of this study was to identify the delays facing the patient with AMI at the Al Ain Hospital, prior to thrombolysis, with the aim of reducing delays in thrombolytic therapy for AMI patients.

This study made a significant contribution to the overall care and management of the AMI patient through the identification of the areas of delays and addressing them in an effort to reduce the door-to-needle time for future AMI patients.

The specific objectives related to the study were to

- determine the extent of the delays facing the AMI patient at this hospital from the time of arrival till thrombolysis time
- identify the specific areas where the delays occur
- identify the reasons for the delays
- identify whether thrombolytic therapy is administered within 30 minutes of arrival at the hospital as recommended by the NHAAP (1994:314)

The study design selected for this research was a quantitative, non-experimental, descriptive, retrospective study to understand the phenomenon studied. This study falls into the category of applied research as the knowledge generated could directly affect or improve the practices of door-to-needle time in thrombolytic therapy for patients with AMI. The purpose of applied research is to solve problems, make decisions or control outcomes in real- life practice situations.

The sample selected comprised 351 patients who were treated for AMI with thrombolytic therapy at the Al Ain Hospital from January 2002 to December 2003. The cases were chosen according to the following eligibility criteria for thrombolysis:

- Chest pain lasting more than 30 minutes
- Presenting to hospital within 12 hours after onset of symptoms  
(Some doctors allowed up to 24 hours)
- The ECG recording must have had at least 2 of the following:

- ST Elevation present in 1mm in 2 limb leads
- ST Elevation 2mm in 2 contiguous chest leads
- New Left Bundle Branch Block
- Posterior MI with tall T waves V2 and V 3 (refer Figure 2.5)

In addition, the patient must have been selected after careful exclusion of the following conditions, namely that relative and absolute contradictions to therapy must have been assessed prior to considering therapy (see Table 2.5).

The data collection consisted of a retrospective chart analysis, through the use of a highly structured instrument to gather the desired responses from the files of 351 patients selected subject to inclusion criteria. The instrument was developed after the literature review and consultation with several experts in both the fields of cardiology and instrument development.

The researcher had to personally collect the data in the confines of the file section, to maintain confidentiality and also ethical considerations as discussed. In addition the information was protected with a secret password to which only the researcher had access.

## 5.2.2 Findings

This study contributed to the identification of the delays facing the AMI patient prior to receiving thrombolytic therapy from the time of arrival at the hospital.

The delays, strengths and weaknesses of the overall management of the patient at the Al Ain Hospital were identified. The findings from this study will assist health care providers to be aware of the magnitude of their responsibility in contributing to reducing the time to thrombolyse the AMI patient, thus affording the eligible patient the maximum benefit from thrombolytic therapy. The findings will also contribute to reducing the associated mortality and morbidity rates related to myocardial infarction.

In addition, the outcomes of thrombolysis could be improved, thereby affording the patient the best chance of survival. The researcher's conclusions are based on the objectives and research

questions stated in chapter 1 (see sections 1.7 and 1.8).

### ***5.2.2.1 What is the extent of the delays facing the AMI patient?***

AMI is a serious health issue, with a high mortality and morbidity rate, requiring the urgent attention of health care providers to afford the patient the maximum benefit of thrombolytic therapy, which is within the first two hours, as the myocardial cells necrose as soon as fifteen minutes after infarction. Pre-hospital delays are inevitably present in the majority of the patients, therefore the urgency to reduce the time to thrombolysed this vulnerable patient after arrival.

Time has been identified as the main impediment to successful outcomes of thrombolytic therapy. Speed and efficiency in the overall care needs to be re-evaluated at the Al Ain Hospital for this vulnerable patient so that the patient is given the best chance of survival.

This study revealed that delays are present before the AMI patient receives thrombolytic therapy after arrival till administration of the thrombolytic agent. The delays occurred at several points during the patient's movement from the triage area to the area where thrombolysis was commenced. Although the delays were varied in nature, they appeared to be concentrated in certain areas that needed urgent attention.

Delays were also identified even from the onset of the symptoms up to the time of administration of thrombolytic therapy and recommendations that might help solve this problem have been discussed, such as transportation and call for ambulance as well as the reasons for delays.

### ***5.2.2.2 Where did the delays occur mainly?***

The area of delays occurred throughout the patient's movement in the Accident and Emergency Unit and even after admission to the critical care units. However, it was concentrated mainly in the area after referral by the doctor in the accident and emergency unit to the physician, to make the decision to thrombolysed.

Once the patient had been triaged, the ECG obtained, the doctor in the accident and emergency unit immediately attended to the patient, and referred the patient to the physician, which is the policy at Al Ain Hospital. Thereafter the patient awaited the arrival of the physician to decide to thrombolysed. This is the area where the delays occurred mainly, according to the study.

Although the doctors in the accident and emergency unit made the diagnosis in almost 68,22% of cases, they had to refer the patient to the physician to make the decision to thrombolysed. The physician made the diagnosis in only 20,56% of cases.

About 67,19% of the patients were seen within 30 minutes of referral and 35,96% after 30 minutes. Only 1,26% were seen by the physician within 10 minutes of referral by the doctor in the accident and emergency unit. This area appears to have been the major area where the delays occurred. The mean was 40,14 and the standard deviation 65,18 minutes. The findings also revealed that physicians made 76,64% of the decision and the cardiologist 22,74% of the decision.

Only 1,26% of the patients were seen within 10 minutes, which is far from the recommendation of the NHAAP.

### ***5.2.2.3 Identify the reasons for the delays***

The reasons for the delay were not easily identified and further research will be necessary to provide correct answers to this question. However some tentative answers could be found.

- One of the most obvious reasons is that the patient, after being diagnosed by the doctor in the accident and emergency unit, had to be referred to the physician. This is the policy at the hospital, which may need reviewing or modification.
- Delays by the physician could be related to numerous reasons and must be explored further to establish the causes.
- The medical wards were covered by the physician on call and the on call doctor was responsible to answer the emergency call, probably leading to delays in reaching the patient in time.
- Furthermore, the medical wards were extremely busy and the physician might have been

overwhelmed.

- According to this research finding, the doctor working in the accident and emergency unit made the diagnosis in 68,22% and the physician diagnosed 20.6% of the study sample. The time to thrombolyse might have been greatly reduced if the doctor in the accident and emergency unit prescribed the thrombolytic agent at the time of first assessment. The patient could have been seen directly by the physician on arrival to limit possible delays in decision-making. The other possibility is to have a physician placed at the emergency unit to evaluate all chest pain. The area at the referral point needed urgent attention. Drawing up clinical pathways and increasing the accountability of all personnel involved may be an option.
- Only a small portion (4,36%) received thrombolytic therapy within the recommended time of door-to-needle time, leaving the large majority (95,0%) receiving thrombolytic therapy after the recommended time to thrombolyse. Decision-making after arrival needed urgent attention in order to reduce the door-to-needle time.

#### ***5.2.2.4 Is thrombolysis in accordance with the NHAAP recommendation of 30 minutes from "door-to-needle time"?***

According to this study, the ideal time to thrombolyse AMI patients has not been reached in Al Ain Hospital. The findings indicated that only a small portion, namely 4,36%, received thrombolytic therapy within the recommended time of door to needle time, and a large majority, almost 95,0%, of the patients received thrombolytic therapy after 30 minutes. Prehospital delays were undeniably present from the onset, therefore efforts must be directed to reducing the time to thrombolyse on arrival, as the benefit wanes after time has elapsed.

After the decision to thrombolyse was made, delays with the administration of the agent were identified which must be addressed and eliminated.

Only 43,30% of the patients were thrombolysed within 30 minutes after the decision was made by the physician and 29,91% received TT after 30 minutes and within 1 hour of the physician's decision with a further 24,61% between 1 to 3 hours after the decision to thrombolyse was made. The delays were present in all three units reserved for thrombolysis. In some cases, the

delays were as lengthy as 2 to 3 hours. The mean was 45,06 and standard deviation 70,14 minutes.

Thrombolysis is the non-surgical method with excellent reports of success in many countries and was the only available method of reperfusion at this hospital hence the urgency to treat soon after arrival. This could only have been achieved if the health care providers were aware and committed to improving the time to thrombolyse after the patients arrived at the hospital. Although pre-hospital thrombolysis is the solution of choice in several countries, it has not been envisaged at this hospital and was also not practised in this country according to cardiologists consulted.

### 5.3 LIMITATIONS OF THE STUDY

The researcher found the following limitations in this study:

- This study had the potential limitations of a retrospective design, including the small portion of females in the study.
- The study was only conducted in one hospital in the UAE, namely Al Ain, which had a different infrastructure and process outcomes and therefore the results obtained may not be generalized universally. The practice at Al Ain Hospital may not have been representative of the practice in other hospitals.
- A theoretical limitation is that very few sources were available on this topic where actual research was done. A literature review revealed that little information was available from the UAE records, and the sparse information gathered from the review was not of benefit to this study.
- The patient records were incomplete and the availability of some records was one of the constraints.
- Record-keeping on documents was poorly done, both by medical and nursing staff, with flaws in almost all aspects of recording. Sparse information was given related to history, time of onset, time first seen and time of treatment. Only in a few cases was the documentation clear and concise. In most of the files, the time was obtained by subtracting the one from the other to arrive at the estimated time.
- Time to gather data was tedious as data collection was impeded within the constraints of



the hospital policy. The patient records could not be removed from the records department, so the researcher was forced to gather information in the filing section. More often than not, files had to be recalled for clarity and this was time-consuming.

- The clinical pathway for the treatment of the AMI patient was either not clear or lacking, with numerous delays after arrival till the doctor's decision on the patient.

## 5.4 CONCLUSIONS

In this section the door-to-ECG collection time, the door-to-needle time and the symptom-to-needle time is discussed.

### 5.4.1 Door-to-ECG collection

This is the point where all chest pain patients can have their diagnosis either confirmed or ruled out. The sooner the diagnosis is established, the better the chance of survival for the patient hence the recommendation by the NHAAP to obtain an ECG recording as soon as 10 minutes after arrival.

The ECG in this study was collected within the first 10 minutes in 52,55% of the patients after arrival at hospital and 47,45% were obtained after 10 minutes. Furthermore, in 14,00% of cases the ECG was acquired at surrounding hospitals and PHC but was not considered, as this study was focused on the door-to-needle time exclusively at this facility. Only in 3,74% of cases was the ECG done after 1 but before 3 hours. The nurses in at least 54,21% of the cases acquired the ECG and 44,86% were initiated by the doctor in the accident and emergency unit or the physician. The mean was 22,98 minutes with a standard deviation of 58,35 minutes.

The time to acquire an ECG recording could have been improved with a view to improving the time to thrombolysed. Obtaining an ECG in this hospital does not require a doctor's order, so the nurses should be encouraged to do an ECG recording for all chest pain patients. More sustained direction and coaching and support of nursing personnel is essential to assist them to do their best to reduce the door-to-needle time and mortality and morbidity rates.

#### 5.4.2 Is the door-to-needle time in accordance with the NHAAP's recommendation?

According to this study, the ideal time to thrombolysed has not yet been reached by the Al Ain Hospital in the treatment of the AMI patient.

The study revealed that only 4,36% of the cases were thrombolysed within 30 minutes of arrival; 61,99% between the 1-3 hour period; 16,20% within an hour and a further 13,08% cases after 3 hours with 2,49% of cases who were thrombolysed after 6 hours of arrival.

The mean door-to-needle time was 123 with a standard deviation of 100 minutes. Efforts must be directed towards reducing the time to make the decision to thrombolysed.

#### 5.4.3 The symptom-to-needle time

Patients also contributed to delays, either due to their own decision or circumstances beyond their control even before they arrived at the hospital.

Only 27,41% of the patients sought medical attention within the first 2 hours after symptom onset. The majority, namely 49,84% of cases, fell into the 2-6 hour time period to seek assistance after onset of symptoms; 11,52% after 6 hours and at least 7,47% of cases arrived at hospital after 24 hours, contributing to prehospital delays.

Furthermore, only 1,25% of cases were thrombolysed within 30 minutes to 1 hour after symptom onset and 41,74% between 3 to 6 hours. Only 21, 81% received thrombolysis between 6 to 12 hours after symptom onset and as few as 12,46% after 12 hours. In some cases, the patients arrived at the hospital late and therefore they contributed to the delays in thrombolysis. The mean time was 366,05 minutes and standard deviation 274,8 minutes.

Pre-hospital delays should be addressed in this country as patient-related delays are lengthy. These delays could be reduced through awareness programmes and campaigns to educate the public on chest pain and the rapid reaction to it. This must be discussed with the administration and other decision making bodies to progress further, however, as this is the United Arab Emirates and the laws governing the country differ from South African laws. Pamphlets, brochures and

handouts could be printed and handed out to susceptible/vulnerable groups, but further investigation into the feasibility would have to be made prior to executing this action. Permission must be sought from the hospital director and the administration prior to executing any plan to improve the care of the AMI patient.

## 5.5 RECOMMENDATIONS

Based on the findings and conclusions of this study, the researcher makes the following recommendations for improving patient care and for future research.

### 5.5.1 To improve patient care

The study revealed various implications for medical and nursing practice in the treatment of the patient with AMI, such as:

- Setting up a task force to deal with relevant issues with accident and emergency unit, ICU and CCU nursing and medical personnel with a view to setting goals and objectives in treatment protocols.
- Improving and maintaining accurate documentation and records.
- Improving the methods and system of triaging of the patient.
- Establishing clarity in referral and decision-making pathways.
- Establishing mechanisms to admit patients soon after order.
- Future training of ambulance personnel in recovery of AMI patients.
- Ensuring optimum time to thrombolysse.
- Implementing more visibility in method of transport, receiving and recording of the patient who calls for assistance.
- The implementation of clinical pathways and protocols to limit door-to-needle time in the accident and emergency unit.
- Development of awareness programmes for public and workplace areas, with

cholesterol, blood pressure, glucose level monitoring and educational discussions.

### 5.5.2 Future research

There are numerous possibilities for further research to be conducted in the following areas:

- The nursing personnel in all critical areas could be researched for their awareness of and commitment to this condition and its related treatment and complications arising.
- Exploring the reasons for delay by physicians in assessing and deciding on thrombolysis.
- Determining the delays in transfer of patients from accident and emergency units to critical units after admission order.
- Examining the feasibility of a thrombolysis by the accident and emergency doctor and emergency unit.
- Prehospital delays and their related reasons.
- A prospective research study on the door-to-needle time after the above have been addressed.

## 5.6 CONCLUSION

This study explored and identified the delays in administration of thrombolytic therapy of AMI patient from the time of arrival till administration of thrombolytic therapy. In addition, the symptom-to-needle time and symptom-to-door time was also identified and presented.

The identified recommendations will serve to improve awareness and commit health care providers to rendering the best possible care to the AMI patient eligible for thrombolytic therapy.

The patient must be given the best possible chance of survival by improving the time to thrombolysis. This can only be achieved through education and training of all personnel, through commitment, dedication, absolute cooperation, collaboration and constant update on performance. Regular audits must be conducted with regard to the door-to-needle time and performance of all health care providers.

The door-to-ECG time was also investigated and findings presented and several recommendations made for the possible improvement in reducing the time to thrombolyse. As obtaining an ECG in this hospital does not require a doctor's order, it is recommended that the nurses should be encouraged to do an ECG recording for all chest pain patients. This has been implemented since the commencement of this study as in-service education has taken place with regular audits to ensure that the nursing personnel delivered care with the similar measure of speed and efficiency as that of a trauma patient. However, this has not been sustained due to work commitments.

The study has been followed closely by the consultant cardiologist and then the outcome relayed to him to discuss with team members and staff. In addition, the Faculty of Medicine has also been closely monitoring the outcome of this study to improve the standards of care delivered to the AMI patient.

The overall care of the patient with AMI could be improved in various ways, which had to be discussed with the cardiologists and their team, including the physician. The cardiologist assisting with the study has agreed to cooperate in committing to upgrading the standard of the care delivered to the AMI patient.