RETROSPECTIVE STUDY OF ATYPICAL PRESENTATION IN CASES DIAGNOSED AS ACUTE MYOCARDIAL INFARCTION

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ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACS	Acute Coronary Syndrome
AMI	Acute Myocardial Infarction
DM	Diabetics Mellitus
ECG	Electrocardiogram
ED	Emergency Department
HPL	Hyperlipidaemia
HTN	Hypertension
HUSM	Hospital Universiti Sains Malaysia
IHD	Ischaemic Heart Disease
MI	Myocardial Infarction
NSTEMI	Non-ST Elevation Myocardial Infarction
PCI	Percutaneous Coronary Intervention
SOB	Short of Breathing
SPSS	Statistical Package for Social Sciences
STEMI	ST Elevation Myocardial Infarction
TIMI	Thrombolysis In Myocardial Infarction
UA	Unstable Angina
USM	Universiti Sains Malaysia

KAJIANRETROSPEKTIFTENTANGSIMTOMLUARBIASADALAMKES YANG DIDIAGNOSSEBAGAISERANGANJANTUNGAKUT

ABSTRAK

Pengenalan: Perkara asas dalam mendiagnosa serangan jantung akut adalah kewujudan sejarah sakit dada yang mana ia akan mendorong doktor perubatan kecemasan untuk mempertimbangkan ia sebagai salah satu diagnosis yang menggugat nyawa dalam bahagian dada. Terdapat banyak kes-kes dimana doktor berhadapan dengan cabaran dan terpaksa bergantung kepada pengalaman dan teknologi yang ada untuk mencari punca penyakit sekiranya pesakit datang tanpa sejarah sakit dada walaupun pada akhirnya pesakit itu dirawat sebagai serangan jantung akut.

Objektif: Dalam kajian ini, kami telah tentukan bilangan pesakit serangan jantung akut di Kota Bharu, di kawasan pantai timur Malaysia. Di samping itu, kajian ini juga difokuskan kepada tiga simptom luar biasa yang utama termasuk sakit dada luar biasa, kesukaran bernafas, dan sakit ulu hati. Objektif-objektif lain termasuk hasil untuk setiap simptom klinikal dan juga perawatan klinikal di ED dan wad perubatan. Di samping itu, kajian ini juga membandingkan tempoh kemasukan pesakit untuk semua simtom biasa dan luar biasa seperti yang dimaklumkan di atas. Salah satu objektif kajian ini adalah menilai dan menjalinkan antara faktor-faktor risiko daripada segi penyakit-penyakit tambahan yang mungkin mempengaruhi simtom awal serangan jantung akut.

Metodologi: Corak kajian ini adalah kajian retrospektif (kebelakang) untuk pesakit-pesakit yang datang mendapatkan rawatan di Hospital Universiti Sains Malaysia bermula dari 1 Januari 2011 sehingga 31 Disember 2012. Kajian ini bersifat bukan

ujikaji dan ia menggunakan data yang dikumpulkan daripada fail-fail pesakit. Pengumpulan data untuk kajian ini berlaku selama lapan minggu bermula 1 Jun 2013 sehingga 1 Ogos 2013. Sejumlah 442 pesakit serangan jantung akut telah dikenalpasti sepanjang tempoh bermula 1 Januari 2011 sehingga 31 Disember 2012 di HUSM. Data telah dianalisis menggunakan SPSS versi 22.

Hasil utama kajian: Kelaziman untuk serangan jantung akut luarbiasa termasuklah sakit dada luarbiasa, kesukaran bernafas, sakit ulu hati dan lain-lain, kadar kematian dan bagaimana pesakit dirawat jika dibandingkan dengan mereka yang datang dengan sakit dada biasa.

Keputusan: Keputusan daripada data menunjukkan pesakit serangan jantung akut yang datang dengan simtom luarbiasa adalah lebih kerap berbanding yang datang dengan sakit dada tipikal (58.6% vs 41.4%). Umur purata untuk pesakit serangan jantung akut yang dating dengan sakit dada biasa didapati lebih muda berbanding pesakit serangan jantung akut yang dating dengan sakit dada ringan ataupun tanpa sakit dada (58.57 vs 63.12 tahun). Tempoh masa untuk melakukan ECG ataupun memulakan rawatan juga dipengaruhi oleh simtom awal sebagai contoh tempoh purata masa bagi simtom tipikal yang diperlukan bermula dari ketibaan pesakit ke hospital sehingg masa pemeriksaan ECG dilakukan adalah 10 minit manakala bagi simtom luarbiasa, adalah 37.27 minit. Selain itu, tempoh masa pesakit dirawat di wad juga didapati lebih lama bagi kes serangan jantung akut dengan simtom luarbiasa (5 vs 6 hari). Kadar kematian juga didapati lebih tinggi dalam kes simtom luarbiasa jika dibandingkan dengan kes sakit dada biasa/tipikal (9.7 % vs 2.5%).

Kesimpulan: Keputusan data menunjukkan AMI tanpa simtom biasa/klasik adalah kerap berlaku dan pesakit berisiko untuk lewat dilayan dan juga menerima

rawatan yang sewajarnya. Pesakit juga dirawat secara kurang agresif dalam kes simtom luarbiasa, dan juga terdapat kemungkinan untuk tertangguh atau tinggal lebih lama di jabatan kecemasan (ED) sebelum dimasukkan ke wad. Selaini tu, mereka juga mempunyai prognosis yang teruk dan kadar kematian yang tinggi.

RETROSPECTIVE STUDY OF ATYPICAL PRESENTATION IN CASES DIAGNOSED AS ACUTE MYOCARDIAL INFARCTION

ABSTRACT

Introduction: AMI presentation is consider fundamental part for diagnosis as a history of chest pain usually lead the ED physicians to think about it or at least he/she is considered as one of differential diagnosis from all life threatening conditions in thorax region. In many patients, physician might face a challenge or may depend on his experience or technology to figure out the cause of illness if the patient came without chest pain although he/she finally diagnosed as AMI.

Objectives: In this study we have determined the prevalence of AMI in KB in north Malaysian. In addition to that this study focused on three main atypical presentations which include atypical chest pain, shortness of breathing and epigastric pain. Others objectives include the outcome of each clinical presentations as well as clinical approached in ED or medical ward. Furthermore, the study compared the duration of admission for all typical and atypical presentations mentioned above. One of the objectives of this study it assessed and correlated the common risk factors in term of co-morbidities which might affect the initial AMI presentation.

Methodology: The study design was a retrospective study of patients presenting for treatment in Hospital Universiti Sains Malaysia from January 1, 2011, to December 31, 2012. This study non experimental research design using data collected from patient's files of folders. Data collection for this study took place during eight weeks period from June 1, 2013, through August 1, 2013. Total of 442 patients with confirmed as AMI

enrolled from 1st of January 2011 to 31st of December 2012 in HUSM. Data was analyzed by using SPSS version 22.

Main Outcome Measures: Prevalence of atypical AMI presentation include; atypical chest pain, SOB, epigastric pain and others, Mortality rate and how patients were approached in compare to those came with classical chest pain.

Results: Results from data of AMI patients were noticed atypical presentation more common, than typical chest pain (58.6% vs. 41.4%). Mean age of AMI with typical chest pain was found younger than AMI with less chest pain or those without chest pain (58.57 vs. 63.12 years). Time to perform ECG, or started management also was influenced by initial presentation this was appear faster e.g. in DOOR to ECG; in typical presentation 10 minutes, while in atypical presentation the mean time was 37.27 minutes. Also the duration of admission was found to be longer in AMI with atypical presentation (5 vs. 6 days). The mortality rate was higher in atypical presentation when it compared with typical chest pain (9.7 % vs. 2.5%).

Conclusions: Our results data were shown AMI without classical presentations were common and patients at risk to be delayed in term of approach as well as management. Patients were treated less aggressively in atypical presentation; also they could be delayed or stayed longer in ED before admission. Moreover, usually they carry poor prognosis and high mortality rate.

Key words: Chest pain, AMI, ED, STEMI, NSTEMI.

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

Myocardial infarction is also known as heart attack. It is a condition of heart muscles death when one or more coronary arteries which supply oxygen-rich blood to the heart muscle become suddenly blocked. Blockage results from plaques made of fats and cholesterol. The accumulation of this plaque is known as coronary artery disease (Stricker and Goldberg, 2003).

The accumulation of plaque is a process and also can produce chest pain symptom known as angina pectoris A myocardial infarction occurs when a plaque rupture suddenly and it causes a rapid accumulation of clotting factors at the rupture site which leads a sudden obstruction of blood flow in the coronary artery. Sudden obstruction prevents blood reaching the heart muscle. The heart muscles start to die if there is no vital supply of oxygen-rich blood. The longer the obstruction persists, the greater the amount of heart muscle dies. Myocardial Infarction is a medical emergency. If not treated on time it may lead permanent damage of heart muscles (Doering, 1999; Cheng, 2001; Aymong *et al.*, 2007; Burke and Virmani, 2007; Boles *et al.*, 2013).

In spite of all technology and facilities in many centers which provide a top medical care but still heart disease is keeping as a leading cause of death worldwide. Acute Myocardial Infarction (AMI) is considered as hot topic for many studies to assess and evaluate the influence of prevalence, or factors which increase the incidence were taken in many countries with different nations.

Many guidelines either local to specific medical centers or international such as American College of Cardiology updating annually or may be shorter based on many studies published about AMI. Many studies recently took place and assessed the emergency department (ED) in different ways where the patients have to be seen for the first time. These studies focused on ED response since they receive a call for help when the patient in pre-hospital setting as well as in hospital (Ahmar *et al.*, 2008; Hutchison *et al.*, 2013; Ong *et al.*, 2013; Takeuchi *et al.*, 2013).

Acute coronary syndrome (ACS) which include AMI and unstable angina (UA) are common diagnosis in developed countries; usually they share same pathophysiology with different in management. AMI presentations might be acute chest pain or non-specific symptoms like lethargic or shortness of breath (SOB), and epigastric pain considered as one thing that influence the approach, process, or even the outcome(Vitulano *et al.*, 2012).

Time to diagnosis or start treatment of AMI is considered crucial and critical part in American Heart Association (AHA) guideline as the outcome depends on how the case is approached. Measurement of quality in different centers is evaluated by door to ECG, door to needle, or PCI for AMI patients. Any delay in these procedures results in poor prognosis and increase the possibility of complications including death of patients (Zegre Hemsey *et al.*, 2012; Thang *et al.*, 2014).

No doubt clinical presentation of AMI affected the ED physician diagnosis, starting of treatment and disposition. For clinical purpose many literature divided presentation of AMI in general into two groups; typical presentation for those who came with typical chest pain, and atypical presentation if patient has less severe pain or even had initial symptoms like SOB, giddiness, syncope. This classification aim to help and facilitate

diagnosis in ED by identify patients with AMI whom come with atypical presentation in order to decrease missing cases or even avoid delayed in management or disposition.

Many of these atypical symptoms were discussed in many studies and further studies expected to continue analysis for better outcome of patients. It was found that in pre-hospital setting AMI with atypical presentation has got longest time for arrival to ED, approach at ED, less aggressively treated and also higher mortality rate (Zegre Hemsey *et al.*, 2012).

GHAPTER 2

LITERATURE REVIEW

2.1   BACKGROUND

Abdominal pain is one of the common symptoms that let the patients seeking medical advice. In last decades abdominal pain increasing as symptoms as the age of population in the world increasing and studies in 80s and 90s shows elderly patients came with abdominal pain at least 50% were hospitalized and 30-40% had underlining surgical condition. These studies also showed 40% of these patients were misdiagnosed revealed overall mortality rate of approximately 10%. Although most of the cases has been classified as benign conditions with non serious etiologies but there were respective numbers which reached 10 percent from those presented with abdominal pain to Emergency Department had a critical surgical or medical causes which needed urgent intervention or aggressive medical management(Cartwright and Knudson, 2008).

Evaluation of patients came with abdominal pain challenged before the advance technology like computed tomography and ultrasonography which improved the outcome to figure out actual diagnosis of wide spectrum conditions causing abdominal pain. Advance technologies become one of the routine investigations in many centers in developed countries like US or Australia(Esses *et al.*, 2004).

Many of abdominal pain originally due to abdominal organs e.g. peptic ulcer, billiary disorders, and pancreatic pathologies, other few of these cases are referral abdominal pain from pathologies located outside abdominal cavity (Zdzienicka *et al.*,

2007). Although the later sometime is more serious as it reflecting a diseases like acute coronary artery, esophageal pathologies and lungs pneumonia which usually clinically missed or mistaken with other differential diagnosis (Canto *et al.*, 2002; El-Menyar *et al.*, 2011).

2.2   Acute coronary Syndrome

2.2.1   Definition

ACS is spectrum of diseases, including UA, ST –elevation myocardial infarction (STEMI); usually referred to as Q wave myocardial infarction) and non STEMI or (non Q wave myocardial infarction). The last two are grouped under name of AMI (Daida, 2005).

2.2.2   Diagnosis of AMI

Diagnosis of AMI at ED setting usually is challenging generally depends on three components. History plus physical examination is considered one and the first tool of diagnosis, such as ischemic pain as symptom is crucial of assuming the original of this pain due to impaired of coronary artery perfusion or to rule out others pain in thorax or out of thorax. Beside history, examination of cardiovascular system (CVS) to look for tenderness or detecting others causes of chest pain which might mimic ischemic pain beside check the vital signs which is reflecting the cardiac condition. The second important thing to diagnose AMI is bedside 12 leads ECG which need interpretation with other criteria (history, examination and blood tests). The third diagnostic criteria are cardiac enzymes which now consider the main part to establish the AMI diagnosis

especially when the history unreliable and/or ECGs show no changes (Achar *et al.*, 2005; Daida, 2005).

2.2.3 AMI symptoms and presentations

AMI has wide spectrum of symptoms which clinically divided into typical chest pain and other symptoms which related to ischemia or malfunction of heart e.g. mild chest pain, dyspnoea, epigastric, pain, sweating, nausea, (Schelbert *et al.*, 2008).

Patients presented with typical chest pain and diagnosed as AMI usually has better approach regardless of the outcome and usually treated within target time of management of AMI in contrast to other cases presented with symptoms like SOB , nausea, epigastric pain or dyspepsia has had less sense to find diagnosis when it needed further investigations to establish or reject AMI, that worsen the outcome or delayed disposition or even lead to wrong approach (Dorsch *et al.*, 2001).

Many studies were done and shown there were respective numbers of patients diagnosed as AMI although presented with atypical presentations; it was shown 20.2% of all patients admitted with final diagnosis of AMI presented with symptoms other than chest pain. Also was revealed those who came with atypical presentation has had higher mortality rate compared with the group presenting with typical chest pain. Also they were less likely to have treatment in suitable time which leads to poor prognosis among them (Dorsch et al., 2001; Brieger et al., 2004).

Based on Data from the Framingham study which shown up to 25% of acute myocardial infarcts occurred among the participants over 30 years of follow up were firstly

apparent after an examination of the ECG. In almost half of these patients diagnosed AMI had atypical symptoms (Dorsch *et al.*, 2001).

Dyspnoea or SOB as symptoms it is quite common compare with other atypical clinical presentation symptoms. In one study was found AMI patients came with SOB as main presentation in 19%. In other study SOB appeared in 31% from total presentations. Other study was shown epigastric pain was included with other atypical presentation in 2% from all total clinical presentation (Dorsch *et al.*, 2001; El-Menyar *et al.*, 2011).

Abdominal pain in general has wide spectrum of cause which usually clinically differentiated based on location, charter, and examination. Although of present of advance diagnostic tools and facilities in developed world, there are non ignorable proportion of patients has abdominal pain with unclear causes which might lead to delay in approach of such patients (Cartwright and Knudson, 2008). Epigastric pain specifically has been reported to many underline causes one of that AMI (El-Menyar *et al.*, 2011)

2.2.4 Age and AMI presentations

In many studies were shown that the impact of age on AMI presentation, elderly people has uncommon typical presentation and chest pain is less as classical symptoms. If we go in details of these studies, is revealed that the mean age of groups increase from 60s in 1070 to become 75s in 1980s and expected to be more in our era which further increase the incidence of atypical presentation of AMI (Then *et al.*, 2001; Ahmed *et al.*, 2012).

Atypical presentations increase with elderly due to present of many co-morbidities e.g. DM, IHD, Cancers which are common among them, hence presentation of them delayed to ED and delayed reperfusion or missed reperfusion therapy in AMI that why the investigators notice they got worse outcome compare to young people (Canto *et al.*, 2002; Eagle *et al.*, 2002).

AMI presentation without chest pain delayed arrives to hospital (mean 7.9 vs. 5.3) and they have higher thrombolysis in myocardial infarction (TIMI) score compare with typical chest pain. Patients presented without chest pain less like to be diagnosis specifically either AMI or UA and in some cases diagnosed as other diseases some of them (Canto *et al.*, 2000).

2.2.5 Impact of gender on AMI patients

In typical presentation, study shows there was no difference between women and men in final diagnosis AMI (Milner *et al.*, 2002). In one of study, shows men had higher incidence (40% vs. 38%) than women patients to come with classical AMI chest pain (Canto *et al.*, 2000; Then *et al.*, 2001). In other study gives details that women usually come late by 12 hours after symptoms started compare to male (El-Menyar *et al.*, 2009).In other which reveal women usually came with non—ST-segment elevation myocardial infarction (NSTEMI) or UA higher than men whom has high incidence to present with STEMI compare with women (El-Menyar *et al.*, 2013). Overall, mortality rate in AMI show women has had higher percentage of death in cases diagnosed as AMI (Canto *et al.*, 2002).

2.2.6 AMI presentations and diabetic mellitus

Diabetic patients was found had has higher rate of silent AMI, in one study was found 39% from 826 diabetic patients were asymptomatic in term of presentation, in other study was detected 51% from 151 diabetic patients with dyspnoea, and in 44% from 760 diabetic patients with angina. Furthermore it shown that diabetic patients carried worse outcome in compare with non diabetic when they came with SOB as symptom of AMI (Brieger *et al.*, 2004; Zellweger *et al.*, 2004).Study shows Patient with DM and had AMI usually treated less aggressively and had higher mortality rate, this appeared in one study conducted on DM patients with AMI (Trichon and Roe, 2004).

2.2.7 Others AMI risk factors which impact clinical presentation

Clinical presentation of AMI also will be more as atypical in group of patient whom they are suffering from hypertension, smoking, hyperlipidaemia, chronic kidneys disease and history of IHD. Studies show presence of these risk factors increase the incidence of atypical presentation with poor outcome (Ali *et al.*, 2011; Brunori *et al.*, 2014).

2.2.8 AMI presentation and outcome

Early diagnosis is essential to improve risk stratification which in many cases depend on clinical judgment which usually vague in cases presented with atypical symptoms. In many cases, AMI patients were found either had one or both of ECG and cardiac enzymes are normal or sometimes not relevant to clinical situation of patients (Soiza *et al.*, 2006). Generally atypical presentation of AMI without chest pain is common and associated with high mortality rate (El-Menyar *et al.*, 2011; Brunori *et al.*, 2014).

CHAPTER3

Research Objectives and Study purposes

3.1 Objectives of the study

3.1.1General objectives

- Determine the prevalence as well as issues related to approach, management and risk factors of AMI patients.

3.1.2 Specific objectives

- To determine the prevalence of atypical AMI in different clinical presentations presented to Emergency department in Hospital Universiti Sains Malaysia in Kota Bharu city.

- To evaluate the risk factors in different (typical and atypical) clinical presentations in AMI patients.

- To evaluate approach of AMI patients in ED in term of door to ECG performance, door to needle and disposition.

- To evaluate the outcome as mortality rate and duration of admission of patients diagnosed as AMI.

3.2Study purposes

The purpose of this study is to evaluate atypical AMI presentation including SOB and epigastric pain, as most of studies either focusing on atypical symptoms in general or evaluate specific symptoms like shortness of breath or atypical chest pain.

Chest pain is defined to typical and atypical by (1) the presence of substernal chest pain or (2) discomfort that was provoked by exertion or emotional stress and (3) was relieved by rest and/or nitroglycerin. Chest pain was called "typical" angina if patient had all three criteria and atypical or non-angina if less than three criteria were present (Am J Cardiol. 2010).

Although epigastric pain is rare alone as symptoms of AMI but it occur widely secondary to other causes leading to miss diagnosed of many cases of AMI. In this study prevalence of AMI presentations will be evaluated. In addition to that it will show the different in approach between different AMI presentations. Also the study assesses the relation of AMI presentations and the risk factors, outcome in term of mortality, of AMI in different clinical presentations.

Aim of this study to improve awareness among doctors in emergency Department when they dealing with AMI patients when they come atypically as well as others management to pick up atypical presentation of AMI which will help in risk stratification of these patients.

CHAPTER 4

MATERIALS AND METHODS

4.1. Setting

The study was conducted in the ED Hospital Universti Sains Malaysia (HUSM) in the period between first of August 2012 up to end of October 2014. Approval of the ethics committee was obtained prior to data collection.

HUSM is located among a well-appointed site in a heart of Kubang Kerian, area in Kota Bharu a big city in the North East of Malaysia with population of 1.5 to 2 million. HUSM strive to provide the best services and treatment. Efforts that are on-going are to provide medical services, learning and research with the best efficiency to all patients. The ED HUSM provides the service for all kind of illness over 24 hours. This service is encompasses clinical and administrative aspects for all individual in emergency and critical situations for trauma and non-trauma conditions which are range from critically ill to minor ailments, the service is provided 24hours every day.

It involves rapid accessibility to the services where the patient is triaged, provisionally diagnosed, stabilized, managed and referred appropriately to the corresponding medical specialty or discharged home by ED staff. The component of the service provided by ED HUSM: pre-hospital care services which include: Ambulance service: primary emergency response and inter-facility transfer, Medical direction, provided by Medical Emergency Coordinating Centre (MECC) and HUSM dispatcher unit, Mass casualty incident and disaster management. Medical stand by the ED HUSM provides hospital

based services which include: Triage services, Emergency clinical, social care and Observational medicine in the Trauma Ward.

The ED is composed three main Zones; Red Zone where the critically ill patients are seen, Yellow Zone and Green zone for non-risk patients. The triage system in emergency depends on the three levels triage.

4.2. Study design

The design is a retrospective study of patients presenting with AMI patients visited ED HUSM from January 1, 2011, to December 31, 2012. Patients' folders were reviewed and data was collected for this study over eight weeks period from June 1, 2013, through August 1, 2013.

4.3. Study population

The study population have been included all patients diagnosed as AMI whom came to HUSM from January 1.2011 to December 31, 2012.

4.4 Inclusion and Exclusion criteria s

4.4.1 Inclusion criteria

- Patients diagnosed by ED or medical team as AMI based on history plus ECGs changes and/or cardiac markers.

- Both genders.

- Age more than 18 years.

4.4.2 Exclusion criteria

- AMI Patients referred or diagnosed or started treatment before registered in ED HUSM.

- Patients whom developed AMI at the ward after admission.

4.5 Ethical approval

This study was undertaken as a dissertation study for the of Master of Medicine (Emergency Medicine) under the HUSM and approved by the department board review and Human Research Ethics Committee, Universti Sains Malaysia (USM) on the 20th August 2013 (FWA Reg. No: 00007718; IRB Reg. No: 00004494).

4.6 Sample size

By using formula for calculating the sample size based on a previous study result which reveal AMI was found atypical presentation of 78% in NSTEMI and 91% in STEMI (Canto *et al.*, 2002). In this study sample was calculated in all objectives and highest sample size was chosen the formula show sample of all atypical should be 254 to 274 candidates. Data collection yielded from 600 subjects of ACS patients. From this sample 442 subjects were Included in this study.

$$n= \left[\frac{Z^2}{\Delta}\right] P(1-P)$$

$$= \left[\frac{1.96^2}{0.05}\right] 0.22(1-0.22)$$

$$= 264 \pm 10\%$$

4.7 Study variable

The dependent variables in this study are time from registration, time from performing ECG, time for starting treatment of AMI, time of reviewing by medical doctor and duration of admission. Other variables include risk factor (DM, HPT, IHD, HLP, and SMOKING). Other variables are final diagnosis and outcome. All these variables overweight based on initial presenting symptoms which included typical chest pain, atypical chest pain, short of breath, epigastric pain and others clinical presentations.

4.8 flow Chart

Retrospective Study Of Atypical Presentation In Cases Diagnosed As Acute Myocardial Infarction (AMI)

```
                    ┌─────────────────────────┐
                    │   Patients registered in │
                    │          HUSM           │
                    └─────────────────────────┘
                                │
  ┌──────────┐      ┌─────────────────────────┐      ┌──────────┐
  │ Exclusi  │      │      Diagnosed AMI       │      │ Inclusio │
  └──────────┘      └─────────────────────────┘      └──────────┘
                                │
                      ┌──────────────────┐
                      │   Collect the    │
                      │      Data        │
                      └──────────────────┘
                                │
              ┌─────────────────────────────┐
              │    Data interpretation       │
              └─────────────────────────────┘
                                │
                  ┌─────────────────────────┐
                  │    Statistical Analysis  │
                  └─────────────────────────┘
                                │
                        ┌──────────────┐
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                        ┌──────────────┐
                        │  Discussion   │
                        └──────────────┘
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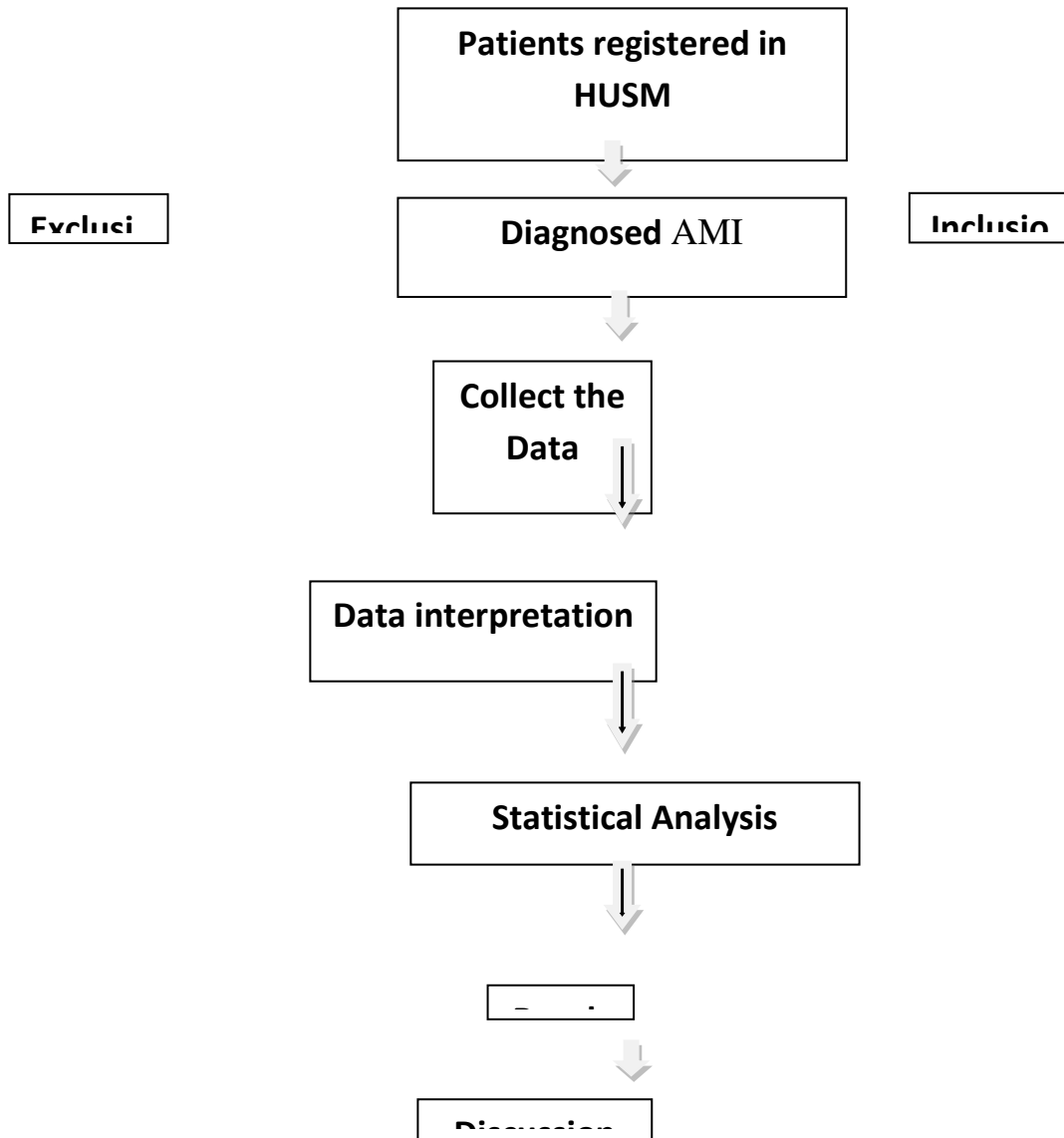
4.8 Gantt chart

Retrospective Study Of Atypical Presentation In Cases Diagnosed As Acute Myocardial Infarction (AMI)

Activities	Years									
	2012		2013				2014			
	Months									
	7 - 9	10 - 12	1 - 3	4 - 6	7 - 9	10 - 12	1 - 3	4 – 6	7- 9	10
Preparation of the proposal	→									
Submission for ethical approval			→							
Arrange and preparation for study				→						
Data Collection and analysis					→	→				
Results and conclusion							→			
Report writing and manuscript preparation								→		
Submission									→	

Milestone of Research Activities

1. End of September 2013: Completion of phase 1 Data Collection.
2. End of December 2013: Completion of phase 2 Data Collection
3. End of June 2014: Completion of phase 3 Data Collection.
4. End of July 2014: Data Analysis.
5. July 2014: Preparation of Research Presentation.
6. October 2014: Report submission.

4.9   Data collection

Starting from ED registration office, folders of patients whom are included in the study based on inclusion criteria are identified. The folders then retrospectively followed at HUSM Record Unit after patients discharged or dead. For purposes of this study, data was collected by modified data form structural sheet which cover the information will be needed for achievement the purpose of study.

Data was collected by using structural form patients ED folders as well as medical review when they reviewed patient at ED or later in the ward. In this study all patients diagnosed as AMI were selected and included during specific time (2011/2012). Diagnosis of AMI was based firstly on history plus physical examination this considered one and the first tool of AMI diagnosis, such as ischemic pain as symptom is crucial of assuming the original of this pain due to impaired of coronary artery perfusion or to rule out others pain in thorax or out of thorax. The second important thing to diagnose AMI is bedside 12 leads ECG which need interpretation with other criteria (history, examination and blood tests). The third diagnostic criteria are cardiac enzymes which now consider the main part to establish the AMI diagnosis especially when the history unreliable and/or ECGs show no changes (Achar *et al.*, 2005; Daida, 2005).

Starting from demographic picture of patients including age, sex and race. All patients above 18 years old regardless their gender or ethnicity are included. Chief complaint or the main problem which let the patient visited ED has been identified then has been divided based on initial compliant into two groups, first those who came with typical

chest pain and the second those who came with atypical presentations, the later was sub-grouped more into four groups for the purpose of this study which include mild chest pain, SOB, epigastric pain as symptoms of ACS and others symptoms uncommon symptoms which was collected in one group e.g. lethargic, LOC, syncope and giddiness.

Beside the main complaint risk factors also are identified which include diabetic mellitus, hypertension, hyperlipidaemia, ischemic heart disease. Time of registration was included to determine starting of investigations and management, also to know duration and time to be seen by medical team at ED and total time spent in ED and finally to see how long patient have been admitted in the hospital. Time was calculated from the moment that the patient was registerd in ED until disposition to different medical wards.

The initial and unique investigation for this study was ECG (door to ECG), and the time to perform ECG was measured in minutes which are calculated from the time patients were registered in ED until ECG was performed. The second time is to indentify how fast management of AMI started by using time of given anti-coagulant or thrombolytic (door to needle) which calculated in hours from the moment patient was registered in ED until patient was received thrombolytic or anticoagulant.

The time was taken since patient was registered to be seen by medical doctor was calculated in hours. Also the duration of staying in ED was measured in hours by subtracting the disposition from arrival time to ED.

All patients diagnosed as AMI were grouped into NSTEMI and STEMI based on final diagnosis. Following these patients the duration of admission was calculated in days. The last variable included in this study was outcome or discharge status which either a live patient or dead. This was details based on different presentations in both STEMI and NSTEMI.

In this study, in order to reduce mistake during data collection, we spent suitable time in patients the recording of data, and ensure accurate records of each single patient's by figure out accurate data as possible as could be, then completed recording of the data and to avoid bias or confounding.

4.10 Data analysis

Data was analyzed by using SPSS version 22.The prevalence of the patients whom fit the criteria will be analysis by using frequency and explore of each type of AMI presentation. Other part was analyzed by using chi-square (X^2) test. Other parts which include analysis to evaluate time to action in all different AMI presentation nonparametric tests Mann-Whitney U test are used.

CHAPTER 5

RESULTS

5.1 General Review

Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 22. Out of the 107102 patients presented to ED over two years (2011/2012), 442 of patients diagnosed as AMI was included in the this study. Analysis base on demographics, clinical presentation of AMI patients which divided into two groups; first group is typical clinical presentation, the second group divided in to sub-groups which include four of atypical AMI presentations these are; chest pain with less severity, SOB, epigastria pain and other presentation. Last one is a group of very rare symptoms were collected in one group, these like syncope, LOC and lethargic.

Data was analyzed in different ways; these include; descriptive analysis, this was used to analyze the data by using proportion. Student-t test and Pearson chi-square (X^2) test were used for categorical or numerical variables whenever applicable. Risk factors were analyzed using nonparametric test because the variables not normally distributed. Statistical significance was defined as a *P* value of less than 0.05.

T test was not valid to assess the association between some variables e.g. duration of admission, because the data is not normally distributed, therefore the nonparametric test Mann-Whitney U Test was used to compare between different groups.

5.2 Descriptive study based on demographic

Table 5.1 shows that percentages of AMI based on age groups, the result shows higher percentage of cases between 61 to 80 years old (49.8%) followed by 41.7% for those between 41 to 60 years old.

Table 5. 1The distribution of the patients diagnosed as AMI according to age

Age	Frequency	Percentage
18-40	16	3.7
41-60	185	41.7
61-80	220	49.8
More than 81	21	4.8

Figure 5. 1 shows distribution of AMI by gender. Results shows, 79% of the patients were male while 21% are of the opposite gender. There is clear evidence that male about four times more female.
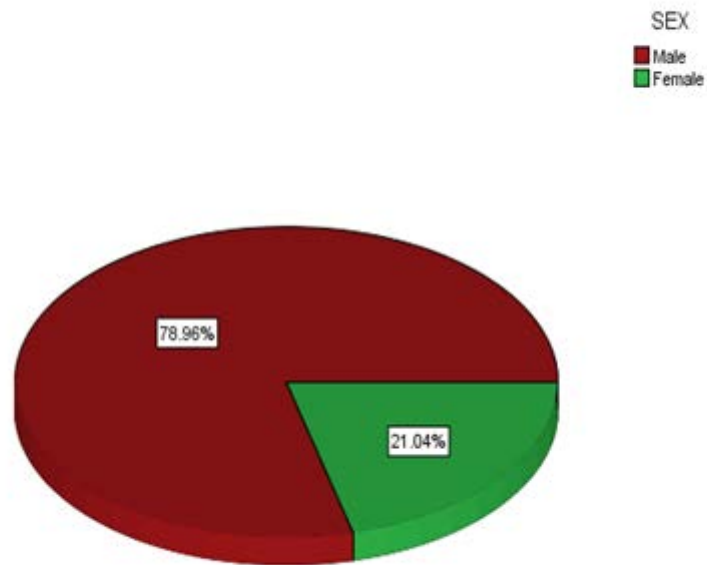

Figure 5. 1 the distribution of patients diagnosed as AMI based on gender

Figure 5.1 shows the distribution of respondents by race. By studying the results, 96.4% of AMI patients were Malay, followed by 3.2% of patients were Chinese, Hence, it is easy to see that the majority of the patients were Malay.
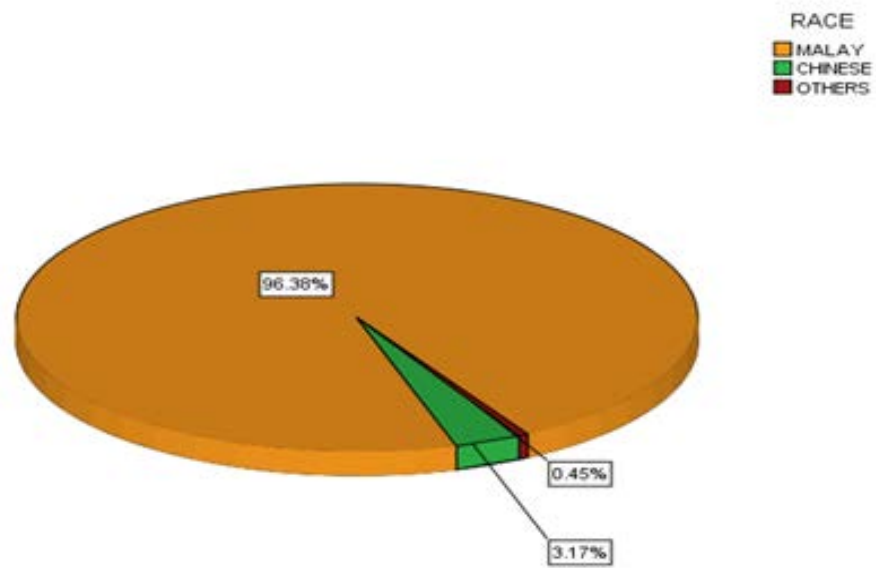

Figure 5. 2 the distribution of AMI patients according to race