# National Cardiovascular Disease Database (NCVD)

## Inaugural

## Report of the Acute Coronary Syndrome (ACS) Registry

## 2006

Editors:

Wan Azman Wan Ahmad
Sim Kui-Hian

**Published by:**

National Cardiovascular Disease Database

1st Floor MMA House,
124, Jalan Pahang,
53000 Kuala Lumpur,
Malaysia

Tel : (603) 4044 3060 / (603) 4044 3070
Fax : (603) 4044 3080
Email : ncvd@acrm.org.my
Website : http://www.acrm.org.my/ncvd



This report is also published electronically on the website of the National Cardiovascular Disease Database at:
*http://www.acrm.org.my/ncvd*

ISSN 1985-4757
9 771985 475008

# FOREWORD

I extend my heartiest congratulations to the National Cardiovascular Disease Database (NCVD) team for recognising the critical status of Acute Coronary Syndrome in Malaysia through the production and publication of this inaugural NCVD ACS Registry Report Year 2006.

This report provides an estimation of acute coronary syndrome cases and describes the provision of acute coronary care services in our country. The data presented here details the trend of acute coronary syndrome and current practices related to acute coronary care services. As the report comprehensively covers such vital information, it can easily be utilised by cardiologists and physicians to improve patient outcomes and be used as reference material for policymakers to plan better cardiac care services in the future.

I would like to commend the Clinical Research Centre, the National Institute of Health, Malaysia and the National Heart Association of Malaysia for coordinating and supporting this registry, an important endeavour in our strive to create awareness of acute coronary syndrome and the importance of its treatment and management.

I wish you all the best and thank you for this effort.

**Y. Bhg. Tan Sri Dato' Seri Dr. Hj Mohd Ismail Merican**
Director-General of Health Malaysia
Ministry of Health Malaysia

**AMERICAN COLLEGE OF CARDIOLOGY**
Heart House**,** 2400 N Street NW, Washington DC, 20037

On behalf of the American College of Cardiology (ACC), I extend my sincerest congratulations for the inaugural report of the Malaysian Acute Coronary Syndrome Registry.

There have been tremendousadvances in ACS treatment over the last 25 years. Despite these advances, however, it is clear that evidence is unevenly translated into clinical practice. In virtually all countries and practice settings where it has been measured, there are significant gaps between guideline recommendations and actual clinical care. In the United States (US), the Institute of Medicine has said there is a “quality chasm” in healthcare, and has strongly advocated the need to make healthcare delivery more effective, safe, equitable, timely, efficient, and patient-centered.

To achieve these aims of higher quality of care, a critical first step is to measure how care is currently being delivered. Only in this way, can gaps in care delivery be identified and targeted quality improvement interventions are implemented. In this way, quality improvement itself becomes “evidence-based”, and is more likely to lead to substantive improvements in patient outcomes.

With this context, the Malaysian Acute Coronary Syndrome Registry and National Cardiovascular Disease Database (NCVD) are a tremendous accomplishment. This is a world-leading effort that can demonstrate the importance of clinical registries as a facilitator of improving quality of care and patient outcomes. The data reported here can and should lead to targeted local and national quality improvement efforts for ACS care. The ongoing existence of the registry will allow tracking of the impact of these quality improvement efforts on processes of care and patient outcomes. The inclusion of longitudinal care and patient outcomes in the NCVD is a laudable goal and places this effort ahead of almost all others in the world.

The American College of Cardiology National Cardiovascular Data Registry (NCDR) currently includes an ACS registry as well as four other quality improvement registry programs in the United States. The mission of the NCDR is to improve the quality of cardiovascular patient care by providing information, knowledge and tools, implementing quality initiatives; and supporting research that improves patient care and outcomes.

This is clearly a shared mission with the Malaysian Acute Coronary Syndrome Registry/NCVD. As such, I hope that we can work collaboratively to show the world how to optimally measure and improve the quality of care and outcomes of patients with cardiovascular disease.

Sincerely,

**John S. Rumsfeld, MD PhD FACC FAHA**
Chief Science Officer and Chairman of the Management Board,
American College of Cardiology National Cardiovascular
Data Registry (NCDR)
Email: jrumsfel@acc.org

EUROPEAN SOCIETY OF CARDIOLOGY®

To

Professor Dr. SIM Kui-Hian
President 2008-2010
National Heart Association of Malaysia (NHAM)

Ludwigshafen / Germany, July 18, 2008

Dear Professor Sim,

Thank you very much for providing to me the Report of the Malaysian Acute Coronary Syndrome (ACS) Registry which was started in 2006 with the support of the Ministry of Health and the National Heart Association of Malaysia (NHAM).

I congratulate you on this important contribution providing new insights into clinical practice of current ACS management in Malaysia. In contrast to randomized controlled trials (RCT), which consider highly selected patients treated in specialized centers, prospective registries document the current status of treatment of consecutive patients in clinical practice. They therefore provide information about patients, who usually are excluded from RCT, e.g. women, older patients, high risk patients or patients with multiple concomitant diseases. Your comprehensive report for the first time provides important data on the clinical presentation of ACS in Malaysia, on acute treatment in daily practice as well as on hospital and 1-year outcome.

Overall, there are a lot of similarities to data presented in European ACS registries, but also very specific differences especially with respect to the patient population, which in Malaysia is significantly younger and does have a different risk profile. These differences in baseline characteristics already might influence treatment decisions as well as outcome. This is only one of many arguments which underline the importance of specific Malaysian data.



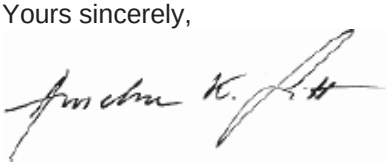
The European Heart House - 2035, Route des Colles - Les Templiers - BP 179 - 06903 Sophia Antipolis Cedex - France
Tel. +33-(0)4 92 94 76 00 - Fax. +33-(0)4 92 94 76 01 - Web Site: www.escardio.org

EUROPEAN SOCIETY OF CARDIOLOGY®

Most importantly, prospective registries play a key role in quality assurance in cardiovascular medicine. They help identifying gaps between treatment in “real life” and recommendations of guidelines and even are a feasible and effective tool for quality assessment and for improving adherence to existing treatment guidelines.

I very much would like to encourage you to continue this important project in the future.

Yours sincerely,



Anselm K. Gitt, MD, FESC
Chairman ESC Euro Heart Survey Programme 2004-2008



The European Heart House - 2035, Route des Colles - Les Templiers - BP 179 - 06903 Sophia Antipolis Cedex - France
Tel. +33-(0)4 92 94 76 00 - Fax. +33-(0)4 92 94 76 01 - Web Site: www.escardio.org

## ACKNOWLEDGEMENTS

The National Cardiovascular Disease Database (NCVD) would like to give its appreciation to everyone who has helped make this report possible.

We would especially like to thank the following:

- Our source data providers, cardiologists and physicians working in the participating sites
- Clinical Research Centre, Ministry of Health
- Ministry of Health Malaysia
- The members of various expert panels

# PREFACE

In this day and age, the practice of medicine in Malaysia and internationally demand evidence based data and consideration of health economics. Although cardiovascular (CV) disease is one of the top mortalities in Malaysia, we only have minimal data on many aspects of the CV disease in our country.

Under the 9th Malaysia Plan, CV disease is listed as one of the top 8 diseases for priority research in Malaysia. The NCVD - ACS Registry (2006) and NCVD - PCI Registry (2007) were started with grants from the Ministry of Health Malaysia (MOH) Malaysia as well as the National Heart Association of Malaysia (NHAM).

We would like to express our heart-felt thanks to MOH, NHAM, members of the governance board, chairs for NCVD - ACS Registries and the committee, chair of NCVD publication and the committee, CRC HKL project management team and last but not least, the many investigators and the research nurses across the participating hospitals in the country who sacrificed hours of labour without financial remuneration to turn a dream into reality.

We would like to dedicate our own first NCVD - ACS Registry report to everyone who has contributed to this registry.

Lastly, we look forward to 100% participation across the country in order to build a truly "national" cardiovascular database.

**Prof. Dr. Sim Kui-Hian**
**Co-Chairman**
**NCVD Governance Board**

**Dato' Seri Dr. Robaayah Zambahari**
**Co-Chairman**
**NCVD Governance Board**

# FOREWORD

As Co-Chairs of NCVD Acute Coronary Syndrome (ACS), Dato' Dr. Jeyaindran Sinnadurai (HKL) and I would like to present the first report of the NCVD ACS database.

This report is an analysis of ACS admissions in 11 hospitals involving 3,422 patients in year 2006 and is the cooperative effort of hospitals under the Ministry of Health Malaysia (MOH), National Heart Institute (IJN) and University Malaya Medical Centre (UMMC).

The registry will be expanded later to involve all general hospitals nationwide. It is designed to analyze the characteristics of patients presenting with acute coronary syndromes and their progress in hospital until discharge as well as outcome until the first year of treatment. This ACS database is to compliment the percutaneous coronary intervention (PCI) database. This report has been the collaborative effort of many individuals, hospitals and their staff. It is made possible by funds from the MOH and the National Heart Association of Malaysia (NHAM) as co-sponsors.

On behalf of the NCVD ACS, we would like to express our sincere appreciation and thanks for the untiring efforts of all those who were involved in this registry including the hospital staff concerned. We also would like to thank the hospitals that responded to the CCU survey. We hope that this will be the start of a more comprehensive and ongoing database that will enable us to improve the quality of cardiovascular care in our country.

**Dato' Dr. Jeyaindran Sinnadurai**
**Co-Chairman**
**NCVD-ACS Registry**

**Dato' Dr. Azhari Rosman**
**Co-Chairman**
**NCVD-ACS Registry**

## ABBREVIATIONS

| | |
|---|---|
| ACE | Angiotensin Converting Enzyme |
| ACS | Acute Coronary Syndrome |
| ADP | Adenosine Diphosphate |
| CABG | Coronary Artery Bypass Graft |
| CAD | Coronary Artery Disease |
| CCU | Coronary Care Unit |
| CK | Creatinine Kinase |
| CK-MB | Creatinine Kinase, Muscle and Brain |
| CPG | Clinical Practice Guidelines |
| CRC | Clinical Research Centre |
| CRF | Case Report Form |
| CRW | Cardiac Rehabilitation Ward |
| CV | Cardiovascular |
| CVD | Cardiovascular disease |
| DBMS | Database Management System |
| EDC | Electronic Data Capture |
| GP | Glycoprotein |
| HDL | High Density Lipoprotein |
| ICCU | Intensive Coronary Care Unit |
| ICT | Information and Communication Technology |
| ICU | Intensive Care Unit |
| IT/IS | Information Technology and Information System |
| LDL | Low Density Lipoprotein |
| LMWH | Low Molecular Weight Heparin |
| LVEF | Left Ventricular Ejection Fraction |
| JPN | Jabatan Pendaftaran Negara |
| MOH | Ministry of Health |
| NCVD | National Cardiovascular Disease Database |
| NSTEMI | Non ST-segment elevation Myocardial Infarction |
| PCI | Percutaneous Coronary Intervention |
| PMP | Per Million Population |
| SAP | Statistical Analysis Plan |
| SC | Site Coordinator |
| SD | Standard Deviation |
| SDP | Source Data providers |
| SME | Subject Matter Expert |
| STEMI | ST–segment elevation Myocardial Infarction |
| TIMI | Thrombolysis In Myocardial Infarction |
| T n I | Troponin I |
| T n T | Troponin T |
| UA | Unstable angina |

# ABOUT NCVD

## *Introduction*

The National Cardiovascular Database (NCVD) is a service supported by the Ministry of Health Malaysia (MOH) to collect information about cardiovascular disease in Malaysia, which will enable us to know the incidence of cardiovascular disease, and to evaluate its risk factors and treatment in the country. This information is useful in assisting the MOH, Non-Governmental Organizations, private healthcare providers and industry in programme planning and evaluation, leading to cardiovascular disease prevention and control.

The NCVD is established to integrate various existing databases in individual hospitals either in MOH hospitals or private and other data sources to achieve a nation-wide cardiovascular database.

## *Rationale for Acute Coronary Syndrome (ACS) registry*

Several important issues arise when applying the rigorous standards and protocols from clinical trials into real-life practice which include questions like:

- Are the population and the patient groups in Malaysia similar to those being investigated in the clinical trials?
- Are our hospitals following the guidelines set out by the expert committees?
- Are we seeing the same results and benefits of implementing evidence-based strategies?
- Which strategy will be the best value in terms of cost-effectiveness for the Ministry?

Furthermore, at present much of what we understand about risk and likelihood of CV disease and indeed its incidence and prevalence are derived from 'Western' data. There is now an increasing awareness of ethnic variations and risk, socio-cultural and socio-economic influences as well as geographical variations. The risk prediction of ACS is also unclear and may be different from CV disease patients with chronic stable angina.

These are the reasons why a registry is needed, as it is provides the real-life data that would represent the population.

### *Acute Coronary Syndrome (ACS) Registry*

The NCVD-ACS registry is the first stage in realizing the rationale of a nation wide cardiovascular database. The ACS registry was officially launched on 31st March 2006.

**The objectives are to:**

(i) Determine the number and the time trend of acute coronary syndromes in Malaysia.

(ii) Determine the socio-demographic profiles of these patients to better identify high-risk groups in our Malaysian population.

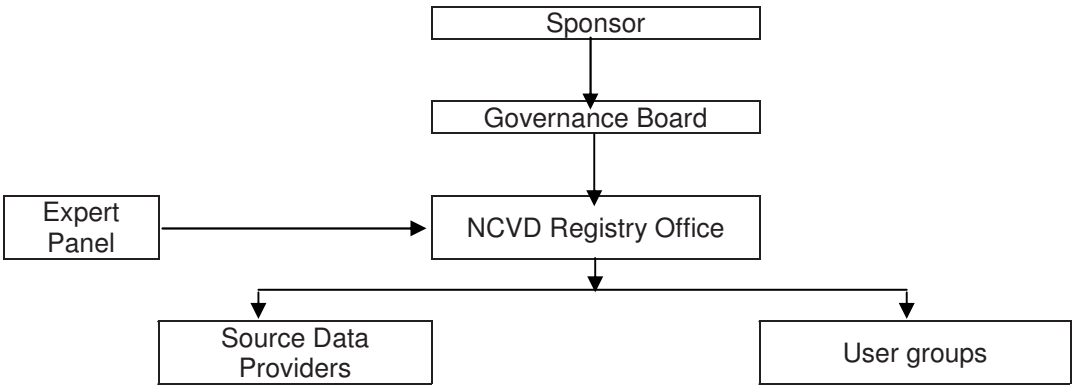
(iii) Determine the efficiency of and adherence to current guidelines of treatment guidelines

(iv) Determine the cost to the nation of cardiovascular disease and the cost effectiveness of treatment and prevention programmes

(v) Stimulate and facilitate research of cardiovascular disease using this database.

This report has met the first and second objectives. The rest of the objectives will be covered in future publications.

### *Organization of NCVD ACS registry*




### *Sponsor*

The NCVD is sponsored by the Ministry of Health Malaysia (MOH) and co-sponsored by the National Heart Association of Malaysia (NHAM). The registry has also been supported by several MOH organizations:

- Cardiology and Medicine Departments
- Clinical Research Centre

### *Governance Board*

The Governance Board was established in year 2006 by sponsors to oversee operations of the National Cardiovascular Disease Database. The MOH, universities, professional bodies, NGOs and private healthcare providers are represented in this committee to ensure that the NCVD stays focused on its objectives, its continuing relevance and justification.
Current membership of the board is as follows:

| **Name** | **Organization** |
|---|---|
| Prof Dr Sim Kui-Hian **(Co-Chairman)** | Head, Department of Cardiology & Clinical Research Centre, Sarawak General Hospital |
| Dato' Seri Dr Robaayah Zambahari **(Co-Chairman)** | Medical Director, National Heart Institute |
| Dato' Dr Omar Ismail | Head, Department of Cardiology, Penang Hospital |
| Dato' Dr Jeyaindran Sinnadurai | Consultant Pulmonary & Critical Care Physician, Department of Medicine, Kuala Lumpur Hospital |
| Prof Dr Wan Azman Wan Ahmad | Head, Department of Medicine, University Malaya Medical Centre |
| Dato' Dr Zaki Morad B Mohd Zaher | Professor, School of Medicine, International Medical University (IMU) |
| Dr Zainal Ariffin Omar | Deputy Director, Non-communicable Disease Section, MOH |
| Dato' Dr K Chandran | Head, Department of Medicine, Ipoh Hospital |
| Dato' Dr Haji Sapari Satwi | Head, Department of Medicine, Tengku Ampuan Afzan Hospital |
| Dr Lim Teck Onn | Director, Clinical Research Centre |
| Dr Hendrick M. Y. Chia | President, National Heart Association of Malaysia (2006-2008) |
| Dato' Dr Azhari Rosman | Hon. Secretary, National Heart Association of Malaysia (2006-2008) |
| Dato' Dr Khoo Kah Lin | Director, National Heart Foundation of Malaysia |
| Prof Dr Abdul Rashid Abdul Rahman | Professor, Faculty of Pharmacy, Cyberjaya University College of Medical Sciences |

### *Steering Committee*

The steering committee comprises individuals who are subject matter experts drawn from the various centres that are involved in the MOH, universities and private hospitals. They are convened to decide on the initial data collection process, develop the pro forma and data content as well as guide future development. They ensure that the database has a sound technical as well as scientific basis.

The role of the steering committee is to:

- Establish policy and procedures for the registry's conduct
- Motivate source data providers (SDP) to continue participation in the registry
- Disseminate information about the registry
- Communicate results locally and internationally.
- Approve, and if necessary validate, the statistical analysis plan,
- Undertake Quality Control of the reported data
- Determine policy and procedures for the operations of the database.
- Establish the Registry Coordinating Centre and appoint its project team members
- Direct the activities of the Registry Coordinating Centre

The current membership of steering committee is as follows:

| **Name** | **Organization** |
|---|---|
| Dato' Dr Jeyaindran Sinnadurai (Co-Chairman) | Kuala Lumpur Hospital |
| Dato' Dr Azhari Rosman (Co-Chairman) | National Heart Institute |
| Assoc. Prof Dr Chin Sze Piaw (Secretary) | International Medical University (IMU) |
| Dr Liew Chee Tat | Penang Hospital |
| Dr Ang Choon Kiat | Sarawak General Hospital |
| Dr Chong Wei Peng | University Malaya Medical Centre |
| Dr Lu Hou Tee | Sultanah Aminah Hospital |

### *NCVD: Registry Coordinating Centre*

| | |
|---|---|
| Clinical Registry Manager | Ms S Gunavathy Selvaraj |
| Clinical Registry Associate | Ms Noor Amirah Muhamad |

**Supporting Staff from the Clinical Research Centre**

The Clinical Research Centre (CRC) of the Ministry of Health provide technical support for the NCVD-ACS Registry. The clinical epidemiologists provide methodological and epidemiological inputs while the database is supported on CRC's IT infrastructure.

| | |
|---|---|
| Clinical Epidemiologist | Dr Jamaiyah Haniff |
| | Dr Anita Das |
| | Ms S Gunavathy Selvaraj |
| Statistician | Mr Muhammad Adam |
| ICT Manager | Madam Celine Tsai Pao Chien |
| Database Administrator | Ms Lim Jie Ying |
| Application Developer | Ms Amy R. Porle |
| Network Administrator | Mr Kevin Ng Hong Heng |
| | Mr Adlan Ab. Rahman |
| Webmaster & Desktop Publisher | Ms Azizah Alimat |
| Clinical Data Manager | Ms Teo Jau Shya |

**Biostatistics Consultants**

Dr Sharon Chen Won Sun

Dr Hoo Ling Ping

Mr Tan Wei Hao

Ms Jasmine Chew

Ms Norhafizah Bt. Ab. Manan

### *Medical Writing Committee*

A Committee has been constituted to prepare the registry regular or interim report, and to prepare the manuscript for journal submission for a particular study based on registry data. The current members of medical writing committee of ACS registry are as follows:

| Name | Organization |
|---|---|
| Prof Dr Wan Azman Wan Ahmad (Chairman) | University Malaya Medical Centre (UMMC) |
| Dato' Dr Azhari Rosman | National Heart Insitute |
| Assoc. Prof Dr Chin Sze Piaw | International Medical University (IMU) |
| Dr Chong Wei Peng | University Malaya Medical Centre (UMMC) |
| Dr Alan Fong Yean Yip | Sarawak General Hospital |
| Dr Saravanan Krishnan | Sultanah Aminah Hospital |
| Dr Hazlyna Kamaruddin | National Heart Institute |

## CONTENTS

ACKNOWLEDGEMENTS ..... i
PREFACE ..... ii
FOREWORD ..... iii
ABBREVIATIONS ..... iv
ABOUT NCVD ..... v
Introduction ..... v
Rationale for Acute Coronary Syndrome (ACS) registry ..... v
Acute Coronary Syndrome (ACS) Registry ..... vi
Organization of NCVD ACS registry ..... vi
Sponsor ..... vi
Governance Board ..... vii
Steering Committee ..... viii
NCVD: Registry Coordinating Centre ..... ix
Medical Writing Committee ..... x
CONTENTS ..... xi
LIST OF TABLES ..... xii
LIST OF FIGURES ..... xiv
INTRODUCTION ..... 1
CHAPTER 1 PROVISION OF ACUTE CORONARY CARE SERVICES IN MALAYSIA ..... 3
CHAPTER 2 PATIENT CHARACTERISTICS ..... 11
CHAPTER 3 CLINICAL PRESENTATION AND INVESTIGATION ..... 60
CHAPTER 4 TREATMENT ..... 85
CHAPTER 5 OUTCOMES ..... 121
APPENDIX A: DATA MANAGEMENT ..... 154
APPENDIX B: STATISTICAL METHODS ..... 158
APPENDIX C: PARTICIPATING CENTRE DIRECTORY ..... 161
APPENDIX D: CCU SURVEY PARTICIPATION ..... 164
APPENDIX E: NOTE OF APPRECIATION ..... 168
APPENDIX F: DATA DEFINITIONS ..... 172

## LIST OF TABLES

Table 1.1 Acute Coronary/ Cardiac Care Services and Admissions in Malaysia 2006 ..... 6
Table 1.2 Utilization of Acute Coronary/Cardiac Services in Malaysia 2006 ..... 7
Table 1.3 Cardiac Care provided for ACS in Malaysia 2006 ..... 8

Table 2.1 Summary of patients characteristics for patient with ACS, Malaysia 2006..... 18
Table 2.2.1 Distribution of patients with ACS by SDP, Malaysia 2006 ..... 27
Table 2.2.2 SDP-ethnicity distribution of patients with ACS, Malaysia 2006 (row percent)..... 28
Table 2.2.3: SDP-ethnicity distribution of patients' admitted to participating sites, Malaysia 2006 (row percent) ..... 29
Table 2.2.4 SDP-gender distribution of patients with ACS, Malaysia 2006 (row percent)..... 30
Table 2.2.5: SDP-gender distribution of patients admitted to participating sites, Malaysia 2006 (row percent) ..... 31
Table 2.3 Age-gender distribution for patients with ACS, Malaysia 2006 ..... 32
Table 2.3.1 Age-gender distribution for patients with ACS by ethnic group, Malaysia 2006 ..... 33
Table 2.3.2 Age-gender distribution for patients with ACS by pre-morbid diabetes, Malaysia 2006..... 35
Table 2.3.3 Age-gender distribution for patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 37
Table 2.3.4 Age-gender distribution for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 39
Table 2.3.5 Age-gender distribution for patients with ACS by family history, Malaysia 2006.... 41
Table 2.3.6 Age-gender distribution for patients with ACS by smoking status, Malaysia 2006. 43
Table 2.4 Pre-morbid distribution for patients with ACS, Malaysia 2006 ..... 45
Table 2.5 Presence of cumulative risk factors ..... 46
Table 2.6 Summary table of cardiac presentation for patients with ACS, Malaysia 2006 ..... 48
Table 2.7 Characteristics of patients with ACS by ACS stratum, Malaysia 2006 ..... 49
Table 2.7.1 Age-gender distribution of patients with ACS by ACS stratum, Malaysia 2006..... 58

Table 3.1 Cardiac presentations of patients with ACS by ACS stratum, Malaysia 2006 ..... 63
Table 3.2.1 Cardiac presentation of patients with ACS by age group (years), Malaysia 2006.. 66
Table 3.2.2 Cardiac presentation of patients with ACS by gender, Malaysia 2006 ..... 70
Table 3.2.3 Cardiac presentation of patients with ACS by pre-morbid diabetes, Malaysia 2006..... 73
Table 3.2.4 Cardiac presentation of patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 77
Table 3.2.5 Cardiac presentation of patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 81

Table 4.1 Summary of treatments for patients with ACS by ACS stratum, Malaysia 2006 ..... 89
Table 4.2.1 Treatments for patients with STEMI by age group (years), Malaysia 2006..... 93
Table 4.2.2 Treatments for patients with STEMI by gender, Malaysia 2006 ..... 98
Table 4.2.3 Treatments for patients with STEMI by ethnic group, Malaysia 2006..... 103
Table 4.3.1 Treatments for patients with NSTEMI/UA by age group (years), Malaysia 2006 . 109
Table 4.3.2 Treatments for patients with NSTEMI/UA by gender, Malaysia 2006..... 113
Table 4.3.3 Treatments for patients with NSTEMI/UA by ethnic group, Malaysia 2006..... 116

Table 5.1 Overall outcomes for patients with ACS, Malaysia 2006 ..... 125
Table 5.2.1 Overall outcomes for patients with ACS by age group (years), Malaysia 2006.... 126
Table 5.2.2 Overall outcomes for patients with ACS by gender, Malaysia 2006 ..... 128
Table 5.2.3 Overall outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006 129
Table 5.2.4 Overall outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006..... 131
Table 5.2.5 Overall outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006..... 132
Table 5.3 Overall outcomes for patients with ACS by ACS stratum, Malaysia 2006..... 134
Table 5.4.1 Overall outcomes for patients with STEMI by fibrinolytic therapy, Malaysia 2006 135

Table 5.4.2 Overall outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006 ..... 137
Table 5.4.3 Overall outcomes for patients with STEMI by CABG at admission, Malaysia 2006..... 138
Table 5.4.4 Overall outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006 ..... 140
Table 5.5.1 Overall outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006..... 141
Table 5.5.2 Overall outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006..... 143
Table 5.5.3 Overall outcomes for patients with NSTEMI by pre-admission aspirin use, Malaysia 2006 ..... 144
Table 5.6.1 Prognostic factors for death in hospital among STEMI patients, Malaysia 2006.. 146
Table 5.6.2 Prognostic factors for death in hospital among NSTEMI/UA patients, Malaysia 2006..... 148
Table 5.6.3 Prognostic factors for death in 30 days among STEMI patients, Malaysia 2006 . 150
Table 5.6.4 Prognostic factors for death in 30 days among NSTEMI/UA patients, Malaysia 2006..... 152

## LIST OF FIGURES

Figure 1.1 Relationship between availability of cardiologist and provision of emergency Coronary angiogram and Percutaneous Coronary Intervention (PCI) for patients admitted with ACS in 2006 ..... 9
Figure 1.2 Relationship between availability of Cath Lab and provision of emergency Coronary angiogram and Percutaneous Coronary Intervention (PCI) for patients admitted with ACS in 2006 ..... 10
Figure 1.3 Relationship between availability of cardiac surgical services and provision of emergency CABG for patients admitted with ACS in 2006 ..... 10

Figure 2.1.1 Age group (years) distribution for patients with ACS, Malaysia 2006 ..... 22
Figure 2.1.2 Gender distribution for patients with ACS, Malaysia 2006 ..... 22
Figure 2.1.3 Ethnic group distribution for patients with ACS, Malaysia 2006 ..... 23
Figure 2.1.4 Smoking status for patients with ACS, Malaysia 2006 ..... 23
Figure 2.1.5 Family history of premature cardiovascular disease for patients with ACS, Malaysia 2006 ..... 24
Figure 2.1.6 BMI for patients with ACS, Malaysia 2006 ..... 24
Figure 2.1.7 WHR for patients with ACS, Malaysia 2006 ..... 25
Figure 2.1.8 Waist circumference (cm) for patients with ACS, Malaysia 2006 ..... 25
Figure 2.1.9 Co-morbidities for patients with ACS, Malaysia 2006 ..... 26
Figure 2.2.1 Distribution of patients with ACS by SDP, Malaysia 2006 ..... 27
Figure 2.2.2 SDP-ethnicity distribution of patients with ACS, Malaysia 2006 ..... 28
Figure 2.2.3: SDP-ethnicity distribution of patients' admitted to participating sites, Malaysia 2006 ..... 29
Figure 2.2.4 SDP-gender distribution of patients with ACS, Malaysia 2006 ..... 30
Figure 2.2.5: SDP-gender distribution of patients admitted to participating sites, Malaysia 2006 ..... 31
Figure 2.3 Age-gender distribution for patients with ACS, Malaysia 2006 ..... 32
Figure 2.3.1a Age-gender distribution male patients with ACS by ethnic group, Malaysia 2006 ..... 33
Figure 2.3.1b Age-gender distribution for female patients with ACS by ethnic group, Malaysia 2006 ..... 34
Figure 2.3.2a Age-gender distribution for male patients with ACS by pre-morbid diabetes, Malaysia 2006 ..... 35
Figure 2.3.2b Age-gender distribution for female patients with ACS by pre-morbid diabetes, Malaysia 2006 ..... 36
Figure 2.3.3a Age-gender distribution for male patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 37
Figure 2.3.3b Age-gender distribution for female patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 38
Figure 2.3.4a Age-gender distribution for male patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 39
Figure 2.3.4b Age-gender distribution for female patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 40
Figure 2.3.5a Age-gender distribution for male patients with ACS by family history, Malaysia 2006 ..... 41
Figure 2.3.5b Age-gender distribution for female patients with ACS by family history, Malaysia 2006 ..... 42
Figure 2.3.6a Age-gender distribution for male patients with ACS by smoking status, Malaysia 2006 ..... 43
Figure 2.3.6b Age-gender distribution for female patients with ACS by smoking status, Malaysia 2006 ..... 44
Figure 2.4a Pre-morbid distribution for diabetic patients with ACS, Malaysia 2006 ..... 45
Figure 2.4b Pre-morbid distribution for non-diabetic patients with ACS, Malaysia 2006 ..... 46
Figure 2.5 Distribution of the presence of cumulative risk factors ..... 47
Figure 2.6 Stratum distribution for patients with ACS, Malaysia 2006 ..... 48
Figure 2.7a Age group (years) distribution for patients with ACS by ACS stratum, Malaysia 2006 ..... 53

Figure 2.7b Gender distribution for patients with ACS by ACS stratum, Malaysia 2006 ..... 53
Figure 2.7c Ethnic group distribution for patients with ACS by ACS stratum, Malaysia 2006 ... 54
Figure 2.7d Smoking status for patients with ACS by ACS stratum, Malaysia 2006 ..... 54
Figure 2.7e Family history of premature cardiovascular disease for patients with ACS by ACS stratum, Malaysia 2006 ..... 55
Figure 2.7f BMI for patients with ACS by ACS stratum, Malaysia 2006 ..... 55
Figure 2.7g WHR for patients with ACS by ACS stratum, Malaysia 2006 ..... 56
Figure 2.7h Waist circumference (cm) for patients with ACS by ACS stratum, Malaysia 2006. 56
Figure 2.7i Co-morbidities (only for Yes) for patients with ACS by ACS stratum, Malaysia 2006 ..... 57
Figure 2.7.1a Age-gender distribution for male patients with ACS by ACS stratum, Malaysia 2006 ..... 58
Figure 2.7.1b Age-gender distribution for female patients with ACS by ACS stratum, Malaysia 2006 ..... 59

Figure 3.1.1 Number of distinct angina episodes for patients with ACS by ACS stratum, Malaysia 2006 ..... 65
Figure 3.1.2 Killip classification code for patients with ACS by ACS stratum, Malaysia 2006... 65
Figure 3.2.1a Stratum distribution for patients with ACS by age group (years), Malaysia 2006 ..... 68
Figure 3.2.1b Number of distinct angina episodes for patients with ACS by age group (years), Malaysia 2006 ..... 68
Figure 3.2.1c Killip classification code for patients with ACS by age group (years), Malaysia 2006 ..... 69
Figure 3.2.2a Stratum distribution for patients with ACS by gender, Malaysia 2006 ..... 71
Figure 3.2.2b Number of distinct angina episodes for patients with ACS by gender, Malaysia 2006 ..... 72
Figure 3.2.2c Killip classification code for patients with ACS by gender, Malaysia 2006 ..... 72
Figure 3.2.3a Stratum distribution for patients with ACS by pre-morbid diabetes, Malaysia 2006 ..... 75
Figure 3.2.3b Number of distinct angina episodes for patients with ACS by pre-morbid diabetes, Malaysia 2006 ..... 75
Figure 3.2.3c Killip classification code for patients with ACS by pre-morbid diabetes, Malaysia 2006 ..... 76
Figure 3.2.4a Stratum distribution for patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 79
Figure 3.2.4b Number of distinct angina episodes for patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 79
Figure 3.2.4c Killip classification code for patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 80
Figure 3.2.5a Stratum distribution for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 83
Figure 3.2.5b Number of distinct angina episodes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 83
Figure 3.2.5c Killip classification code for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 84

Figure 4.1.1 Fibrinolytic therapy for patients with STEMI by ACS stratum, Malaysia 2006..... 91
Figure 4.1.2 Cardiac catheterization for patients with ACS by ACS stratum, Malaysia 2006.... 91
Figure 4.1.3 Percutaneous coronary intervention for patients with ACS by ACS stratum, Malaysia 2006 ..... 92
Figure 4.1.4 CABG for patients with ACS by ACS stratum, Malaysia 2006 ..... 92
Figure 4.2.1a Fibrinolytic therapy for patients with STEMI by age group, Malaysia 2006..... 95
Figure 4.2.1b Cardiac catheterization for patients with STEMI by age group, Malaysia 2006 .. 96
Figure 4.2.1c Percutaneous coronary intervention for patients with STEMI by age group, Malaysia 2006 ..... 96
Figure 4.2.1d CABG for patients with STEMI by age group, Malaysia 2006 ..... 97
Figure 4.2.2a Fibrinolytic therapy for patients with STEMI by gender, Malaysia 2006 ..... 100
Figure 4.2.2b Cardiac catheterization for patients with STEMI by gender, Malaysia 2006 ..... 101

Figure 4.2.2c Percutaneous coronary intervention for patients with STEMI by gender, Malaysia 2006 ..... 101
Figure 4.2.2d CABG for patients with STEMI by gender, Malaysia 2006 ..... 102
Figure 4.2.3a Fibrinolytic therapy for patients with STEMI by ethnic group, Malaysia 2006 ... 105
Figure 4.2.3b Cardiac catheterization for patients with STEMI by ethnic group, Malaysia 2006..... 106
Figure 4.2.3c Percutaneous coronary intervention for patients with STEMI by ethnic group, Malaysia 2006 ..... 107
Figure 4.2.3d CABG on admission for patients with STEMI by ethnic group, Malaysia 2006 . 108
Figure 4.3.1a Cardiac catheterization for patients with NSTEMI/UA by age group (years), Malaysia 2006 ..... 111
Figure 4.3.1b Percutaneous coronary intervention for patients with NSTEMI/UA by age group (years), Malaysia 2006..... 111
Figure 4.3.1c CABG for patients with NSTEMI/UA by age group (years), Malaysia 2006 ..... 112
Figure 4.3.2a Cardiac catheterization for patients with NSTEMI/UA by gender, Malaysia 2006..... 114
Figure 4.3.2b Percutaneous coronary intervention for patients with NSTEMI/UA by gender, Malaysia 2006 ..... 115
Figure 4.3.2c CABG for patients with NSTEMI/UA by gender, Malaysia 2006..... 115
Figure 4.3.3a Cardiac catheterization for patients with NSTEMI/UA by ethnic group, Malaysia 2006 ..... 118
Figure 4.3.3b Pecutaneous coronary intervention for patients with NSTEMI/UA by ethnic group, Malaysia 2006 ..... 119
Figure 4.3.3c CABG for patients with NSTEMI/UA by ethnic group, Malaysia 2006 ..... 120

Figure 5.1.1 In-hospital outcomes for patients with ACS, Malaysia 2006..... 125
Figure 5.1.2 30-day outcomes for patients with ACS, Malaysia 2006 ..... 126
Figure 5.2.1a In-hospital outcomes for patients with ACS by age group (years), Malaysia 2006..... 127
Figure 5.2.1b 30-day outcomes for patients with ACS by age group (years), Malaysia 2006. 127
Figure 5.2.2a In-hospital outcomes for patients with ACS by gender, Malaysia 2006..... 128
Figure 5.2.2b 30-day outcomes for patients with ACS by gender, Malaysia 2006 ..... 129
Figure 5.2.3a In-hospital outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006..... 130
Figure 5.2.3b 30-day outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006..... 130
Figure 5.2.4a In-hospital outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006 ..... 131
Figure 5.2.4b 30-day outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006..... 132
Figure 5.2.5a In-hospital outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 133
Figure 5.2.5b 30-day outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006 ..... 133
Figure 5.3.1 In-hospital outcomes for patients with ACS by ACS stratum, Malaysia 2006 ..... 134
Figure 5.3.2 30-day outcomes for patients with ACS by ACS stratum, Malaysia 2006..... 135
Figure 5.4.1a In-hospital outcomes for patients with STEMI by fibronolytic therapy, Malaysia 2006..... 136
Figure 5.4.1b 30-day outcomes for patients with STEMI by fibronolytic therapy, Malaysia 2006..... 136
Figure 5.4.2a In-hospital outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006 ..... 137
Figure 5.4.2b 30-day outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006 ..... 138
Figure 5.4.3a In-hospital outcomes for patients with STEMI by CABG at admission, Malaysia 2006 ..... 139
Figure 5.4.3b 30-day outcomes for patients with STEMI by CABG at admission, Malaysia 2006..... 139
Figure 5.4.4a In-hospital outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006 ..... 140

Figure 5.4.4b 30-day outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006 ..... 141
Figure 5.5.1a In-hospital outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006..... 142
Figure 5.5.1b 30-day outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006..... 142
Figure 5.5.2a In-hospital outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006 . 143
Figure 5.5.2b 30-day outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006..... 144
Figure 5.5.3a In-hospital outcomes for patients with NSTEMI/UA by pre-admission aspirin use, Malaysia 2006 ..... 145
Figure 5.5.3b 30-day outcomes for patients with NSTEMI/UA by pre-admission aspirin use, Malaysia 2006 ..... 145

## INTRODUCTION

Acute coronary syndrome (ACS) remains an important cause of death and hospitalization in Malaysia. It is a clinical spectrum of ischaemic heart disease ranging from unstable angina (UA), non ST-elevation myocardial infarction (NSTEMI) to ST-elevation myocardial infarction (STEMI) depending upon the degree and acuteness of coronary occlusion. The most common cause is the reduced myocardial perfusion due to atherosclerotic plaque rupture, fissuring or ulceration with superimposed thrombosis and coronary vasospasm.

In STEMI there is myocardial necrosis following an acute total coronary occlusion. UA and NSTEMI are considered to be closely related conditions where the coronary artery narrowing is non-occlusive. The clinical presentations are similar, but they differ in severity and whether the ischemia is severe enough to cause sufficient myocardial damage that result in significant elevation of cardiac biomarkers.

Much progress has been made in the management of ACS especially in the last two decades. Cardiovascular medicine is the most evidence-based medicine, thanks to the many good large randomized multi-centre clinical trials that involved new drugs, new treatment modalities and different treatment strategies. To further improve the management of ACS many expert bodies in the world have come up with guidelines in the management of this condition. In Malaysia we have 2 Clinical Practice Guidelines (CPG) for ACS i.e. CPG on Management of Acute ST-Segment Elevation Myocardial Infarction (STEMI) 2007- (2nd Edition) and CPG on UA/NSTEMI 2002.

The update of this second guideline is in the pipeline. To record how we manage this condition in the real world, we have created this registry with the help of many expert bodies. We are very grateful for every assistance and take great pride in publishing our own registry. This is our registry and it belongs to all of us and for the first time we have our own data to refer to at national and international meetings.

This is the fruit of your hard work and it was done in the spirit of ‘Malaysia Boleh’ and we would like to acknowledge all those who have made this report possible. This event will be another milestone in the history of cardiovascular medicine in Malaysia.

The report is divided into 5 chapters and after each chapter important summary points will be highlighted.

Chapter 1: Provision of Acute Coronary Care Services in Malaysia

Chapter 2: Patient Characteristics

Chapter 3: Clinical Presentations and Investigation

Chapter 4: Treatment

Chapter 5: Outcome

# CHAPTER 1

# PROVISION OF ACUTE CORONARY CARE SERVICES IN MALAYSIA

**Sim Kui Hian**

**Wan Azman Wan Ahmad**

**Robaayah Zambahari**

**Chin Sze Piaw**

**Jamaiyah Haniff**

**Lim Teck Onn**

In 2006, there were a total of 31186 admissions to the 73 coronary care units (CCU) in Malaysia, of which 12534 admissions were due to Acute Coronary Syndrome (ACS) (Table 1). The incidence of ACS admission was therefore 47.1 per 100,000 population in 2006. Assuming half of all coronary heart disease (CHD) first presented with ACS and only half were admitted to CCU with a third who died before being admitted into hospital, a rough estimate of the incidence of CHD in Malaysia is 141 per 100,000 population.

The 37 CCUs in MOH hospitals took care of the majority (60%) of ACS admissions, the 3 university hospitals' CCUs cared for another 10% while the private sector accounted for 27% of admissions. As expected, the economically developed states like Penang, Perak, Selangor/Wilayah Persekutuan have disproportionately large numbers of ACS admissions, while the less developed states (Kedah/Perlis, Terengganu, Sabah and Sarawak) were under-resourced, the surprising exception being Kelantan. Thus, the pattern parallels the availability of acute coronary care services in these states.

The 73 CCUs in the country provided 414 CCU beds. Table 1.2 shows the utilization of these resources. The MOH sector is clearly under-resourced relative to the demands it faces, resulting in over 4000 ACS being denied admission into its CCU in 2006. It has a 30% shortfall in CCU beds, and even if non-acute cardiac admissions are excluded, it is still short of 10% of its required bed strength.

Table 1.3 shows the cardiac care ACS patients received after being admitted into CCU. A remarkable 59% of patients in IJN had thrombolytic. Patients in private hospitals, including IJN, are more likely to receive invasive coronary interventions (emergency angiogram, PCI and coronary artery bypass graft [CABG]).

Figure 1.1 and 1.2 shows that the likelihood of ACS patients receiving emergency angiogram, PCI and CABG are driven by availability of cardiologist and on-site invasive cardiac catheterization laboratory (cath lab) facility.

Similarly, the likelihood of receiving emergency coronary artery bypass graft (CABG) correlates with availability of cardiac surgical services (Figure 1.3). What is the optimum level for the provision of these services however remains to be determined, and whether availability of such emergency services translated into better health outcomes are addressed in another chapter in this report.

**Summary Points:**

- The incidence of ACS admission to CCU was 47 per 100,000 populations in 2006.
- MOH Hospitals received 60% of ACS while Private Hospitals account for only 27%. However the MOH sector is clearly under-resourced in terms of CCU beds, on-site Cardiologists, Catheterization Laboratory and Cardiac Surgical Facilities.
- The likelihood of ACS patients receiving intervention (PCI or CABG) is driven by the availability of these resources.

Table 1.1 Acute Coronary/ Cardiac Care Services and Admissions in Malaysia 2006

| | Population | CCU | Total beds | CCU beds | CCU nurses | Cardiologist | | Cath lab | | Cardiac surgical service | | CCU admision | All acute admision | | ACS admision | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | no in 000,000 | No | No | No | No | No | PMP* | No | PMP* | No | PMP* | No | No | PMP* | No | PMP* |
| | | (%) | (%) | (%) | (%) | (%) | | (%) | | (%) | | (%) | (%) | | (%) | |
| **Malaysia** | 26.6 | 73 | 30191 | 414 | 559 | 163 | 6 | 36 | 1 | 27 | 1 | 31186 | 20144 | 756 | 12534 | 471 |
| | | 100 | | 100 | 100 | 100 | | 100 | | 100 | | 100 | 100 | | 100 | |
| | | | | | | | | | | | | | | | | |
| **By sector** | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Private | | 32 | 6357 | 214 | 176 | 81 | | 28 | | 20 | | 13820 | 6286 | | 3398 | |
| | | 44 | | 52 | 31 | 50 | | 78 | | 74 | | 44 | 31 | | 27 | |
| MOH | | 37 | 21118 | 169 | 305 | 37 | | 4 | | 4 | | 14257 | 11809 | | 7580 | |
| | | 51 | | 41 | 55 | 23 | | 11 | | 15 | | 46 | 59 | | 60 | |
| IJN | | 1 | 211 | 12 | 13 | 27 | | 1 | | 1 | | 1307 | 465 | | 335 | |
| | | 1 | | 3 | 2 | 17 | | 3 | | 4 | | 4 | 2 | | 3 | |
| University | | 3 | 2505 | 19 | 65 | 17 | | 3 | | 2 | | 1802 | 1583 | | 1221 | |
| | | 4 | | 5 | 12 | 10 | | 8 | | 7 | | 6 | 8 | | 10 | |
| **States** | | | | | | | | | | | | | | | | |
| P.Pinang | 1.5 | 9 | 3206 | 54 | 63 | 24 | 16 | 6 | 4 | 5 | 3 | 6124 | 2242 | 1502 | 1140 | 764 |
| | | 12 | 11 | 13 | 11 | 15 | | 17 | | 19 | | 20 | 11 | | 9 | |
| Melaka | 0.7 | 4 | 1485 | 31 | 15 | 11 | 15 | 3 | 4 | 3 | 4 | 1961 | 1243 | 1714 | 745 | 1027 |
| | | 5 | 5 | 7 | 3 | 7 | | 8 | | 11 | | 6 | 6 | | 6 | |
| Johor | 3.2 | 5 | 2293 | 30 | 34 | 9 | 3 | 2 | 1 | 2 | 1 | 2846 | 1938 | 611 | 1243 | 392 |
| | | 7 | 8 | 7 | 6 | 6 | | 6 | | 7 | | 9 | 10 | | 10 | |
| Perak | 2.3 | 7 | 2829 | 25 | 58 | 4 | 2 | 1 | 0 | 1 | 0 | 2635 | 2253 | 987 | 1772 | 776 |
| | | 10 | 9 | 6 | 10 | 2 | | 3 | | 4 | | 8 | 11 | | 14 | |
| Selangor & Kuala Lumpur | 6.4 | 22 | 10,118 | 148 | 220 | 86 | 13 | 15 | 2 | 12 | 2 | 9211 | 5634 | 876 | 3683 | 573 |
| | | 30 | 34 | 36 | 39 | 53 | | 42 | | 44 | | 30 | 28 | | 29 | |
| Negeri Sembilan | 1.0 | 4 | 1260 | 17 | 20 | 1 | 1 | 1 | 1 | 0 | 0 | 780 | 621 | 645 | 374 | 389 |
| | | 5 | 4 | 4 | 4 | 1 | | 3 | | 0 | | 3 | 3 | | 3 | |
| Kedah & Perlis | 2.1 | 5 | 2093 | 21 | 33 | 1 | 0 | 1 | 0 | 0 | 0 | 2190 | 1878 | 890 | 623 | 295 |
| | | 7 | 7 | 5 | 6 | 1 | | 3 | | 0 | | 7 | 9 | | 5 | |
| Terengganu | 1.0 | 1 | 821 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 362 | 276 | 265 | 181 | 173 |
| | | 1 | 3 | 1 | 0 | 0 | | 0 | | 0 | | 1 | 1 | | 1 | |
| Pahang | 1.5 | 4 | 1317 | 18 | 28 | 4 | 3 | 1 | 1 | 0 | 0 | 841 | 753 | 518 | 526 | 362 |
| | | 5 | 4 | 4 | 5 | 2 | | 3 | | 0 | | 3 | 4 | | 4 | |
| Kelantan | 1.5 | 3 | 1778 | 17 | 36 | 6 | 4 | 2 | 1 | 1 | 1 | 2380 | 1956 | 1278 | 1438 | 939 |
| | | 4 | 6 | 4 | 6 | 4 | | 6 | | 4 | | 8 | 10 | | 11 | |
| Sarawak | 2.4 | 5 | 1785 | 15 | 22 | 13 | 6 | 3 | 1 | 2 | 1 | 690 | 585 | 248 | 314 | 133 |
| | | 7 | 6 | 4 | 4 | 8 | | 8 | | 7 | | 2 | 3 | | 3 | |
| Sabah | 3.0 | 4 | 1206 | 34 | 28 | 3 | 1 | 1 | 0 | 1 | 1 | 1166 | 766 | 255 | 496 | 166 |
| | | 5 | 4 | 8 | 5 | 2 | | 3 | | 4 | | 4 | 4 | | 4 | |

**PMP = Per Million Population*
*Note: Percentage is to the nearest decimal point*

Table 1.2 Utilization of Acute Coronary/Cardiac Services in Malaysia 2006

| | Pop in 000,000 | Current bed | Bed occup. rate | Use for all acute | Use for ACS | Use for non cardiac | ACS denied | ACS denied | Required bed strengths (RBS) | | RBS if non cardiac excluded | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | No | % of all ACS | No | (% shortfall) | No | (% shortfall) |
| **Malaysia** | 26.6 | 414 | 89 | 65 | 40 | 35 | 6703 | 53 | 515 | 80 | 375 | 110 |
| | | | | | | | | | | | | |
| **Sector** | | | | | | | | | | | | |
| Private | | 214 | 83 | 51 | 27 | 49 | 1635 | 48 | 238 | 90 | 162 | 132 |
| MOH | | 169 | 93 | 77 | 49 | 23 | 4722 | 62 | 242 | 70 | 190 | 89 |
| IJN | | 12 | 83 | 36 | 26 | 64 | 177 | 53 | 13 | 92 | 7 | 171 |
| University | | 19 | 104 | 76 | 58 | 24 | 168 | 14 | 21 | 90 | 16 | 119 |
| | | | | | | | | | | | | |
| **States** | | | | | | | | | | | | |
| P.Pinang | 1.5 | 54 | 148 | 42 | 21 | 58 | 917 | 80 | 71 | 76 | 28 | 193 |
| Melaka | 0.7 | 31 | 59 | 55 | 33 | 45 | 460 | 62 | 35 | 89 | 28 | 111 |
| Johor | 3.2 | 30 | 136 | 75 | 48 | 25 | 700 | 56 | 40 | 75 | 29 | 103 |
| Perak | 2.3 | 25 | 145 | 74 | 58 | 26 | 1116 | 63 | 61 | 41 | 41 | 61 |
| Selangor & Kuala Lumpur | 6.4 | 148 | 75 | 65 | 43 | 35 | 1463 | 40 | 164 | 90 | 128 | 116 |
| Negeri Sembilan | 1.0 | 17 | 47 | 69 | 42 | 31 | 472 | 126 | 21 | 81 | 18 | 94 |
| Kedah & Perlis | 2.1 | 21 | 93 | 83 | 28 | 17 | 182 | 29 | 22 | 95 | 18 | 117 |
| Terengganu | 1.0 | 4 | 59 | 66 | 43 | 34 | 96 | 53 | 5 | 86 | 4 | 100 |
| Pahang | 1.5 | 18 | 41 | 78 | 54 | 22 | 187 | 36 | 19 | 95 | 18 | 100 |
| Kelantan | 1.5 | 17 | 114 | 72 | 53 | 28 | 723 | 50 | 24 | 71 | 17 | 100 |
| Sarawak | 2.4 | 15 | 24 | 76 | 41 | 24 | 46 | 15 | 15 | 100 | 14 | 107 |
| Sabah | 3.0 | 34 | 64 | 57 | 37 | 43 | 340 | 69 | 38 | 89 | 32 | 106 |

*Note: Percentage is to the nearest decimal point.*

Table 1.3 Cardiac Care provided for ACS in Malaysia 2006

| | **Population** | ACS admits | | PMP* | Trombolytic | | PMP* | Angiogram | | PMP* | PCI | | PMP* | CABG | | PMP* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | no in 000,000 | No | % | | No | % | | No | % | | No | % | | No | % | |
| Malaysia | 26.64 | 12534 | 100 | 471 | 4771 | 38 | 179 | 4156 | 33 | 156 | 2552 | 20 | 96 | 858 | 7 | 32 |
| | | | | | | | | | | | | | | | | |
| **Sector** | | | | | | | | | | | | | | | | |
| Private | | 3398 | 27 | | 837 | 25 | | 2168 | 64 | | 1478 | 43 | | 534 | 16 | |
| MOH | | 7580 | 60 | | 3367 | 44 | | 1403 | 19 | | 801 | 11 | | 264 | 3 | |
| IJN | | 335 | 3 | | 199 | 59 | | 257 | 77 | | 134 | 40 | | 39 | 12 | |
| University | | 1221 | 10 | | 368 | 30 | | 328 | 27 | | 139 | 11 | | 21 | 2 | |
| | | | | | | | | | | | | | | | | |
| **States** | | | | | | | | | | | | | | | | |
| Pulau Pinang | 1.49 | 1140 | 9 | 764 | 373 | 33 | 250 | 534 | 47 | 358 | 367 | 32 | 246 | 119 | 10 | 80 |
| Melaka | 0.73 | 745 | 6 | 1027 | 431 | 58 | 594 | 261 | 35 | 360 | 122 | 16 | 168 | 59 | 8 | 81 |
| Johor | 3.17 | 1243 | 10 | 392 | 337 | 27 | 106 | 450 | 36 | 142 | 307 | 25 | 97 | 89 | 7 | 28 |
| Perak | 2.28 | 1772 | 14 | 776 | 497 | 28 | 218 | 924 | 52 | 405 | 457 | 26 | 200 | 141 | 8 | 62 |
| Selangor & Kuala Lumpur | 6.43 | 3683 | 29 | 573 | 1469 | 40 | 228 | 1238 | 34 | 193 | 908 | 25 | 141 | 277 | 8 | 43 |
| Negeri Sembilan | 0.96 | 374 | 3 | 389 | 200 | 53 | 208 | 66 | 18 | 69 | 40 | 11 | 42 | 14 | 4 | 15 |
| Kedah & Perlis | 2.11 | 623 | 5 | 295 | 343 | 55 | 163 | 128 | 21 | 61 | 78 | 13 | 37 | 26 | 4 | 12 |
| Terengganu | 1.04 | 181 | 1 | 173 | 50 | 28 | 48 | 32 | 18 | 31 | 19 | 11 | 18 | 6 | 3 | 6 |
| Pahang | 1.45 | 526 | 4 | 362 | 313 | 59 | 215 | 93 | 18 | 64 | 55 | 10 | 38 | 19 | 4 | 13 |
| Kelantan | 1.53 | 1438 | 11 | 939 | 515 | 36 | 336 | 197 | 14 | 129 | 119 | 8 | 78 | 44 | 3 | 29 |
| Sarawak | 2.36 | 314 | 3 | 133 | 141 | 45 | 60 | 71 | 23 | 30 | 29 | 9 | 12 | 11 | 3 | 5 |
| Sabah | 3.00 | 496 | 4 | 166 | 102 | 21 | 34 | 162 | 33 | 54 | 51 | 10 | 17 | 53 | 11 | 18 |

**PMP = Per Million Population*
*Note: Percentage is to the nearest decimal point.*

Figure 1.1 Relationship between availability of cardiologist and provision of emergency Coronary angiogram and Percutaneous Coronary Intervention (PCI) for patients admitted with ACS in 2006

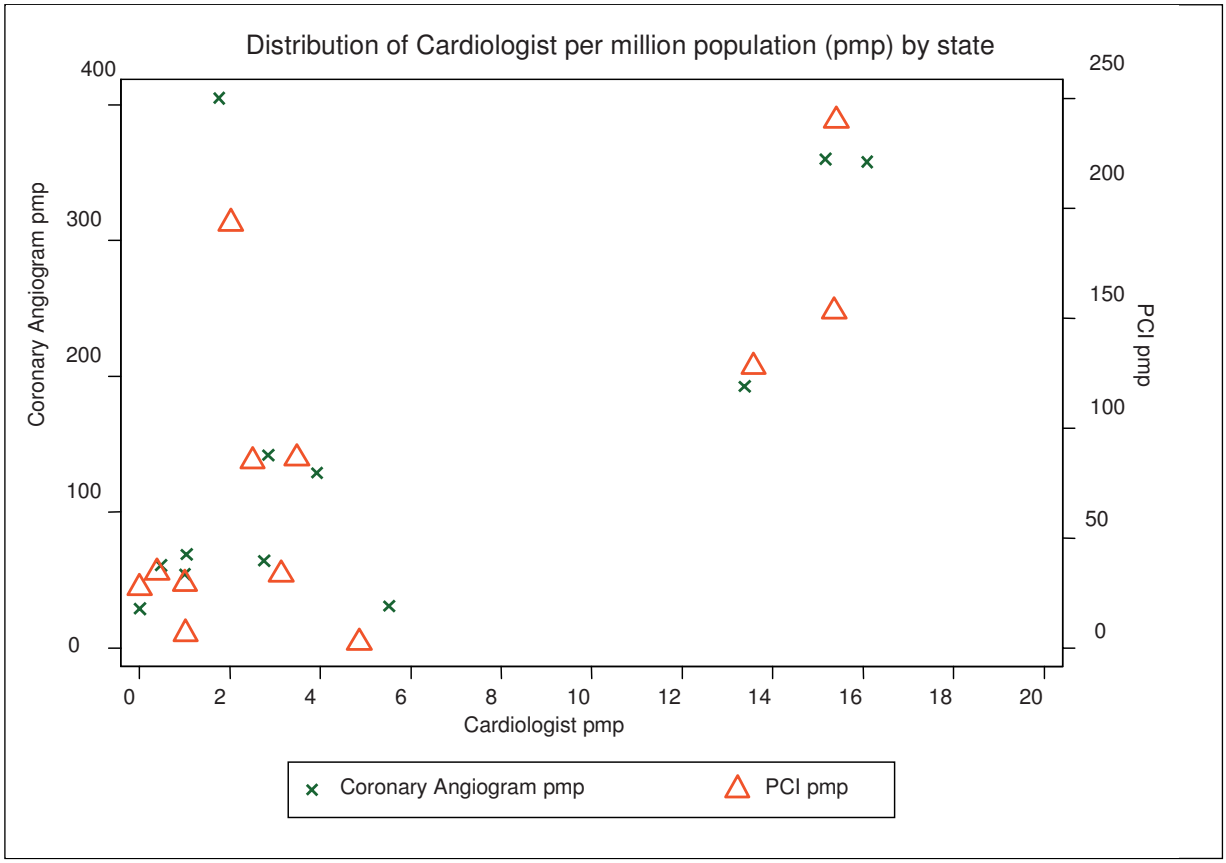


Figure 1.2 Relationship between availability of Cath Lab and provision of emergency Coronary angiogram and Percutaneous Coronary Intervention (PCI) for patients admitted with ACS in 2006

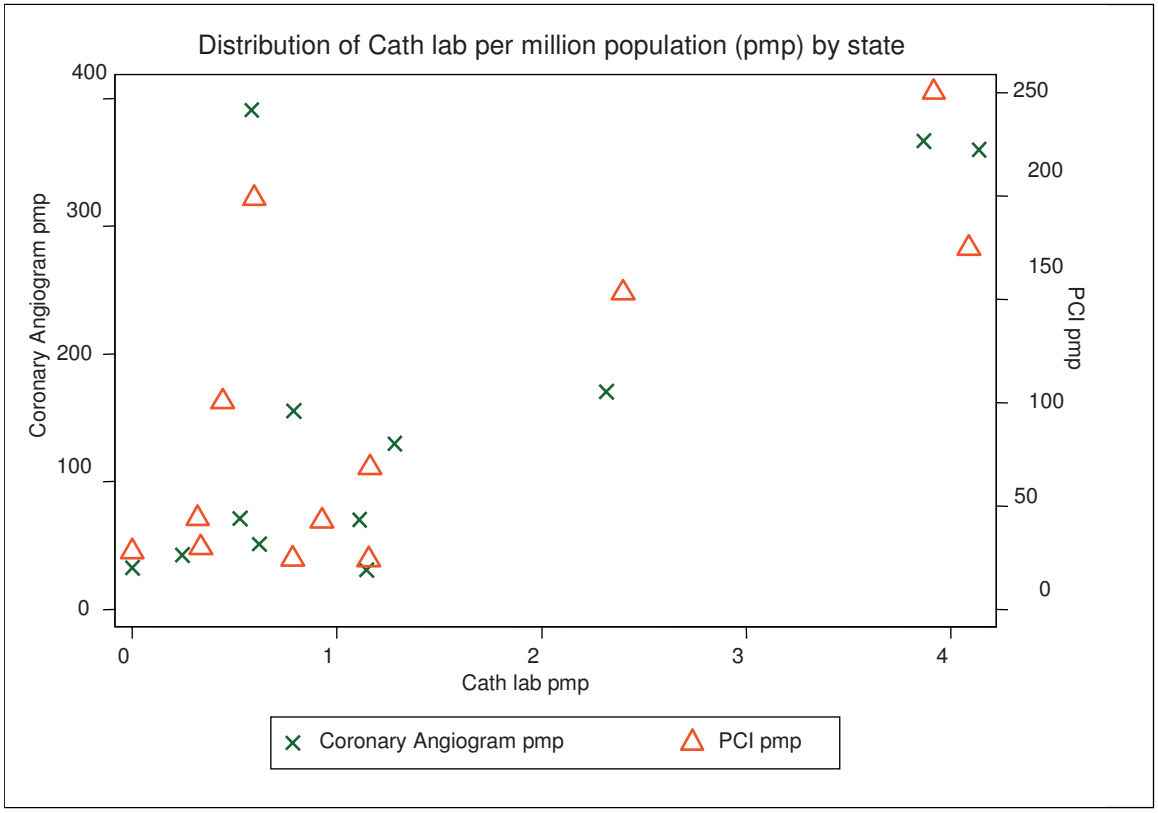
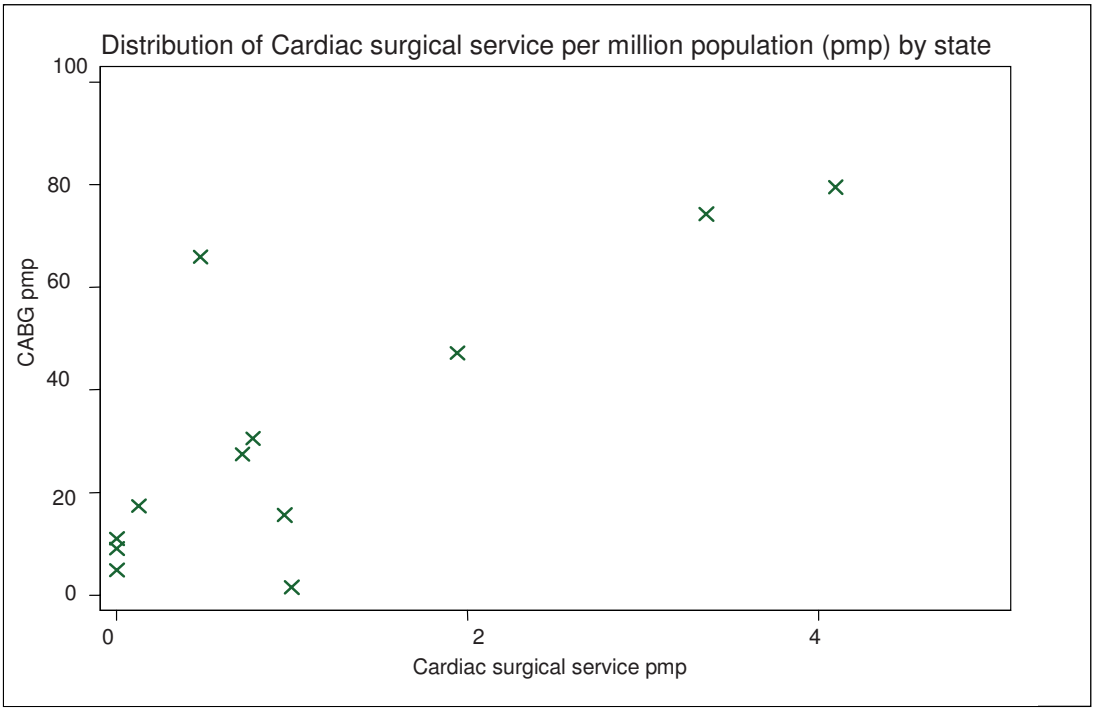



Figure 1.3 Relationship between availability of cardiac surgical services and provision of emergency CABG for patients admitted with ACS in 2006



# CHAPTER 2

# PATIENT CHARACTERISTICS

**Alan Fong Yean Yip**

**Ang Choon Kiat**

**Sim Kui-Hian**

## Introduction

In 2006, a total of 3422 patients had baseline characteristics recorded in the Acute Coronary Syndrome section of the National Cardiovascular Database (ACS; NCVD). These were divided into patient demographics, significant past medical history and anthropometric measurements (Table 2.1)

## Demographics

Of the ethnic distribution, 49% of patients were Malay, 23% Chinese, 23% Indian, and approximately 4% representing other indigenous groups as well as non-Malaysian nationals. The ethnic groups were subdivided into 12 categories to include the most prevalent groups: namely Malay, Chinese, Indian, Orang Asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, Malaysians of other ethnicities and non-Malaysian nationals. The mean age of the patients was 59 years (range 21-100); 23% of the patients were below 50 years; 31% of patients were aged between 50 and 60 years old; 26% were aged between 60 and 70 years old and the remaining 21% aged 70 years and older. In term of gender, 75% of the patients were male.

## Significant past medical history

Smoking history was subdivided to patients having never smoked, 'former smokers' and current smokers. Our findings revealed 40% of patients had never smoked prior to admission, 24% were former smokers and 33% were current smokers. A significant number of patients had a family history of premature cardiovascular disease. Of the 61% of this data field completed, it was noted that 19.7% of patients did have a 'positive' family history. In a recent Public Health Survey, dyslipidaemia, hypertension and diabetes were noted to be prevalent amongst Malaysian adults[3]. Not surprisingly, of the 59% of the dyslipidaemia data field completed, 55.9% of patients had a diagnosis of the condition prior to presentation with ACS. Of the 84% of the hypertension data field completed, 72.6% of patients had a diagnosis of the condition prior to presentation of ACS. Of the 80% of the diabetes data field completed, 55.0% of patients had a diagnosis of the condition prior to admission.

Having a prior history of myocardial infarction increases the risk of subsequent ACS compared to those who had not. Of the 70% of this data field completed, 22.9% of patients had a prior history of a myocardial infarction prior to the index admission with ACS. Similarly, a history of documented coronary artery disease could increase this risk. Of the 66% of this data field completed, 22.7% of the patients had a positive finding of documented coronary artery disease prior to the index admission with ACS.

In terms of symptoms of angina, of the 74% of the data field completed for chronic angina prior to admission, 20.2% of patients were found to have this condition. Of the 79% of the data field

completed for new onset angina prior to admission, 57.0% of patients had this condition prior to the index admission for ACS. Heart failure, particularly of ischaemic origin, is associated with poorer long term clinical outcomes. Of the 75% of this data field completed, 10.7% of patients had a prior history of heart failure prior to admission.

Other non-cardiac co-morbid conditions were also investigated. The result shows that 4% of patients had a history of chronic lung disease prior to admission, with 75% of this data field completed. 7% of patients had renal disease prior to admission, with 75% of this data field completed. 4% of patients had a prior history of cerebrovascular disease, with 75% of this data field completed. 1% of patients had a prior history of peripheral vascular disease, with 74% of this data field completed, Combining all the variables above, 91% of the data fields were completed; 97.8% of patients had at least one of the above-mentioned cardiovascular risk factors at the index admission with ACS.

Analysis of patients with coronary artery disease, aggregating subjects with a prior history of myocardial infarction, with angiographically-proven coronary stenosis of greater than 50%, with chronic angina and new onset angina, 80% of the data fields were completed; 80.0% of patients had symptoms or established documented evidence of coronary artery disease prior to the index admission with ACS.

**Anthropometrics**

Patient anthropometric data was subdivided into Body Mass Index (BMI), Waist-Hip Ratio (WHR) and waist circumference.

The mean BMI was 25.8 ± 4.51; the median BMI was 25.2 (13.2-62.4). 75% of subjects had a BMI>23. 40.7% of patients had a calculated WHR obtained. The mean WHR was 0.97 ± 0.08; the median WHR was 0.96 (0.54-1.85). 28% of male subjects had a WHR>1.0; 88% of female subjects had a WHR>0.85. 34.0% had a waist circumference measurement performed. The mean value was 89.8 ± 14.6 cm; the median value was 90cm (36-160); 50% of male subjects had a value over 90cm; 80% of female patients had a value over 80cm.

**Patient characteristics and different types of ACS presentations (Table 2.6)**

Subdividing ACS presentations to ST-elevation myocardial infarction (STEMI; n=1445), non-STEMI (n=1132) and unstable angina (UA; n=845), we found that 42% of patients were admitted with STEMI, 33% with non-STEMI, and 25% unstable angina.

Mean ages for patients presenting with STEMI, NSTEMI and UA were 56, 62 and 60 years respectively; the patient group aged between 50 and 60 years old accounting for 32%, 29% and 31%

of each type of ACS presentation respectively. Comparing gender of ACS presentation in STEMI, NSTEMI and UA group males comprised 85%, 69% and 66% in each group, respectively. On ethnicity, Malays accounted for 54% of patients admitted with STEMI, 45% for NSTEMI and 46% with UA.

Fifty percent of patients admitted with STEMI were current smokers, compared to 23% in the NSTEMI group, and 18% in the UA group. “Never been smokers” accounted for 29% of the STEMI group, 49% for the NSTEMI group and 48% of the UA group. Twelve percent of patients admitted with STEMI had a family history of premature cardiovascular disease, compared with 11% in the NSTEMI group and 13% in the UA group. Nineteen percent in the STEMI group, 41% in the NSTEMI group and 46% in the UA group recorded history of dyslipidaemia. Forty-seven percent in the STEMI group, 70% in the NSTEMI group and 73% in the UA group had a history of hypertension. Thirty-six percent in the STEMI group, 51% in the NSTEMI group and 47% in the UA group had a history of diabetes.

Ten percent in the STEMI group, 19% in the NSTEMI group and 24% in the UA group had a prior history of myocardial infarction. Five percent of patients in the STEMI group, 20% of patients in the NSTEMI group and 24% of patients in the UA group had a previously documented significant coronary artery disease. Accordingly, 7% in the STEMI group, 17% in the NSTEMI group and 25% in the UA group had a prior history of chronic stable angina; however, 43% in the STEMI group, 48% in the NSTEMI group and 43% in the UA group had new onset angina. Three percent in the STEMI group, 14% in the NSTEMI group and 10% in the UA group had a recorded history of heart failure prior to the index admission with ACS.

Two percent in the STEMI group, 5% in the NSTEMI group and 5% in the UA group had a prior history of chronic lung disease. Four percent in the STEMI group, 13% in the NSTEMI group and 6% in the UA group had a prior history of renal disease. Three percent in the STEMI group, 6% in the NSTEMI group and 4% in the UA group had a prior history of cerebrovascular disease; <1% in the STEMI group; 2% in the NSTEMI group and 1% in the UA group had a prior history of peripheral vascular disease.

Ninety-one percent of patients in the STEMI group had at least one of the above mentioned cardiovascular risk factors at the index admission for ACS, compared to 97% in the NSTEMI group and 98% in the UA group.

Mean BMI for patients admitted with STEMI, NSTEMI and UA were 26, 25, and 26 respectively; patients with a BMI>23 accounted for 76%, 72% and 79% of the respective groups. The mean waist-hip ratio (WHR) of patients admitted with STEMI, NSTEMI and UA were 0.97, 0.97 and 0.96 respectively. Whilst the measurements in the male patients were similar, in women, 10% of patients in

the STEMI group, 14% in the NSTEMI group and 9% in the UA group had a WHR of ≤0.85. Mean waist circumference (WC) for patients admitted with STEMI was 89cm; in NSTEMI 90cm and UA 92cm. Forty-eight percent of male patients admitted with STEMI had a WC ≥90cm; compared to 47% in the NSTEMI group and 57% in the UA group. 80% of female patients admitted with STEMI had a WC ≥80, compared to 79% in the NSTEMI group, and 82% in the UA group.

**Commentary**

**Demographics**

In 2006, Malays made up an estimated 50.4% of the total population of 26.64 million, Chinese 23.7%, Indian 7.1%, and Non-Malay Bumiputera 11% [3]. The distribution of Malay and Chinese patients admitted with ACS recorded in this registry for the same year was similar with the proportion of ethnic distribution in the country. While, there were disproportionately more Indian patients and disproportionately less non-Malay Bumiputera patients.

With the country's gender distribution of nearly 1:1, it was surprising to note that 75% of the subjects were male [3]; in comparison to the 66% of male found in the Global Registry of Acute Coronary Events (GRACE) [2]. We used the GRACE Registry as the comparative in this Patient Characteristics as it is the largest ongoing, multicentre Registry, for ACS worldwide.

National statistics reported the life expectancy at birth in Malaysia in 2006 to be 74.1 years, with males living to 71.8 years and females 76.3 years [3]. The mean age for subjects in our registry was relatively young at 59 years. Eighty percent of subjects were aged less than 70 years, and significantly, 23% were aged less than 50 years. The median age of our subjects was 59, which was significantly younger than the 66 years of those found in the GRACE Registry.

**Significant past medical history**

In term of smoking habits amongst subjects in the Registry, 33% were current smokers, compared to 56.7% from the GRACE Registry. The National prevalence of current smokers in adults aged 25-64 years old in 2005/2006 was 25.5% [1]. Despite the comparatively smaller proportion of current smokers in our Registry as compared with GRACE, our subjects present at a younger age. It is possible that our patients are more susceptible to chemicals in cigarette smoke. This is compounded by the observation that nearly a fifth of our subjects have a documented family history of cardiovascular disease.

Hypercholesterolaemia, hypertension and diabetes are prevalent in our country, with reported figures of 53.5%, 25.7% and 5.0% amongst adults aged 25-64 years in 2005/2006 [1]. Our findings

demonstrated that for subjects enrolled into our registry in 2006, 55.9% had dyslipidaemia, 72.6% had hypertension, and 55.0% had diabetes. GRACE Registry figures are 43.6%, 57.8% and 23.3%. Our observations suggest that hypertension and diabetes confers a disproportionately higher risk for developing ACS, when compared to our National population as a whole, and compared to the subjects recruited from the GRACE Registry.

For those with symptoms and known significant coronary artery disease, 80% of our subjects have at least one of the following: a history of angina prior to the index admission with ACS, known angiographically proven coronary artery disease with at least one vessel over 50% stenosis, or a previous documented myocardial infarction. In fact, only 20.2% of patients had chronic stable angina over two weeks prior to admission in contrast with 68.1% demonstrated by the GRACE Registry.

Other cardiovascular risk factors, with the exception of renal dysfunction (9.3% versus 7.2%) featured less commonly in our subjects compared to those in the GRACE registry: history of heart failure (10.7% versus 11.0%), cerebrovascular disease (5.3% versus 8.3%) and peripheral vascular disease (1.4% versus 10.3%).

In terms of patient characteristics, improved completion of data fields over the coming years may yet shed more light into these patterns.

**Anthropometrics**

Anthropometric findings suggest that the majority of our subjects were overweight and had an abnormally elevated abdominal circumference.

**Patient characteristics and different types of ACS presentations**

Our findings reveal that the majority of ACS admissions to our hospitals were STEMI. Furthermore, there are early indications that a large majority of them were male and of Malay ethnicity. The proportion of current smokers was higher in the STEMI group, when compared to NSTEMI and UA. This could indicate that smoking plays a larger role in massive plaque rupture, a hallmark of STEMI, amongst patients admitted with ACS in Malaysia. However, other established cardiovascular risk factors appeared more prevalent in patients presenting with NSTEMI and UA when compared to STEMI. Anthropological measurements did not seem to account for significant differences among the patients presenting with the different ACS presentations except for WHR in the female gender, where a lower ratio seemed to confer a larger protective effect in NSTEMI compared to STEMI and UA.

**Summary Points:**

- Of the 3,422 patients admitted with ACS to the 11 participating sites in 2006, 49% were Malay, 23% Chinese, 23% Indian and about 4% were others.
- 75% of the subjects were male and the female patients may be underrepresented. The mean age for subjects in our registry was also relatively young.
- Subdividing ACS presentations revealed that 42% had STEMI, 33% NSTEMI and 25% UA.
- Patients with STEMI had a younger mean age and comprised more males, Malays and active smokers compared with NSTEMI and UA groups.
- In this registry there was higher prevalence of established cardiovascular risk factors. Upon admission with ACS, majority of them has either history of MI or are known to have significant CAD.

**References:**

1. "Data and Statistics"; Non-Communicable Diseases Surveillance, Malaysia. www.dph.gov.my
2. Granger CB, Goldberg RJ, Dabbous O, et al. Predictors of Hospital Mortality in the Global Registry of Acute Coronary Events. *Arch Intern Med.* 2003:163:2345-2353.
3. "Key Statistics" and "Key Data"; Department of Statistics, Malaysia. www.statistics.gov.my

Table 2.1 Summary of patients characteristics for patient with ACS, Malaysia 2006

| | **Total=3422** |
|---|---|
| **1. DEMOGRAPHICS** | |
| 1.1 Age, years | |
| • Mean, SD | 59 (12) |
| • Median (min, max) | 59 (21,100) |
| | |
| 1.2 Age group, no. % | |
| • 20 - <30 | 23 (1) |
| • 30 - <40 | 143 (4) |
| • 40 - <50 | 621 (18) |
| • 50 - <60 | 1054 (31) |
| • 60 - <70 | 881 (26) |
| • 70 - <80 | 571 (17) |
| • ≥80 | 129 (4) |
| | |
| 1.3 Gender, no. % | |
| • Male | 2569 (75) |
| • Female | 853 (25) |
| | |
| 1.4 Ethnic group, no. % | |
| • Malay | 1684 (49) |
| • Chinese | 786 (23) |
| • Indian | 799 (23) |
| • Orang Asli | 0 (0) |
| • Kadazan | 2 (0) |
| • Melanau | 0 (0) |
| • Murut | 0 (0) |
| • Bajau | 1 (0) |
| • Bidayuh | 28 (1) |
| • Iban | 48 (1) |
| • Other Malaysian | 37 (1) |
| • Foreigner | 37 (1) |
| | |
| **2. OTHER CORONARY RISK FACTORS** | |
| 2.1 Smoking, no. % | |
| • Never | 1370 (40) |
| • Former (quit >30 days) | 805 (24) |
| • Current (any tobacco use within last 30 days) | 1138 (33) |
| • Unknown | 109 (3) |
| | |
| 2.2 Family history of premature cardiovascular disease, no. % | |
| • Yes | 404 (12) |
| • No | 1684 (49) |
| • Not known | 1334 (39) |
| | |

| | **Total=3422** |
|---|---|
| 2.3 Antropometric | |
| BMI | |
| • N | 1926 |
| • Mean, SD | 25.8 (4.4) |
| • Median, (min, max) | 25.2 (13.2,60.4) |
| | |
| BMI, kg/m$^2$, no. % | |
| • <18.5 | 58 (3) |
| • 18.5-23 | 426 (22) |
| • > 23 | 1442 (75) |
| | |
| WHR | |
| • N | 1394 |
| • Mean, SD | 0.97 (0.09) |
| • Median, (min, max) | 0.96 (0.46,1.85) |
| | |
| WHR, no. % | |
| • Men | 1091 |
| • ≤ 1.0 | 786 (72) |
| • >1.0 | 305 (28) |
| • Women | 303 |
| • ≤ 0.85 | 35 (12) |
| • >0.85 | 268 (88) |
| | |
| Waist circumference, cm | |
| • N | 1502 |
| • Mean, SD | 89.7 (14.4) |
| • Median, (min, max) | 90 (36,160) |
| | |
| Waist circumference, cm, no. % | |
| • Men | 1162 |
| • ≤ 90 | 586 (50) |
| • > 90 | 576 (50) |
| • Women | 340 |
| • ≤ 80 | 68 (20) |
| • > 80 | 272 (80) |
| | |
| 2.4 Co-morbidity | |
| Dyslipidaemia, no. % | |
| • Yes | 1131 (33) |
| • No | 902 (26) |
| • Not known | 1389 (41) |
| | |
| Hypertension, no. % | |
| • Yes | 2084 (61) |
| • No | 786 (23) |
| • Not known | 552 (16) |
| | |

| | Total=3422 |
|---|---|
| Diabetes, no. % | |
| • Yes | 1497 (44) |
| • No | 1226 (36) |
| • Not known | 699 (20) |
| | |
| Fasting blood glucose, mmol/L | |
| • N | 2561 |
| • Mean (SD) | 8.2 (4) |
| • Median (min, max) | 6.8 (3,29.9) |
| | |
| Myocardial infarction history, no. % | |
| • Yes | 562 (16) |
| • No | 1847 (54) |
| • Not known | 1013 (30) |
| | |
| Documented CAD > 50% stenosis, no. % | |
| • Yes | 508 (15) |
| • No | 1734 (51) |
| • Not known | 1180 (34) |
| | |
| Chronic angina (onset more than 2 weeks ago), no. % | |
| • Yes | 502 (15) |
| • No | 2012 (59) |
| • Not known | 908 (27) |
| | |
| New onset angina (less than 2 weeks), no. % | |
| • Yes | 1532 (45) |
| • No | 1160 (34) |
| • Not known | 730 (21) |
| | |
| Heart failure, no. % | |
| • Yes | 284 (8) |
| • No | 2289 (67) |
| • Not known | 849 (25) |
| Chronic lung disease, no. % | |
| • Yes | 130 (4) |
| • No | 2431 (71) |
| • Not known | 861 (25) |
| | |
| Renal disease, no. % | |
| • Yes | 253 (7) |
| • No | 2305 (68) |
| • Not known | 864 (25) |
| | |
| Cerebrovascular disease, no. % | |
| • Yes | 149 (4) |
| • No | 2420 (71) |
| • Not known | 853 (25) |
| | |

| | Total=3422 |
|---|---|
| Peripheral vascular disease, no. % | |
| • Yes | 37 (1) |
| • No | 2492 (73) |
| • Not known | 893 (26) |
| | |
| None of the above, no. % | |
| • Yes | 67 (2) |
| • No | 3050 (89) |
| • Not known | 305 (9) |
| | |
| Coronary artery disease**, no. % | |
| • Yes | 2199 (64) |
| • No | 532 (16) |
| • Not known | 691 (20) |

** Not known includes patients who do not know their co-morbidities and missing data*
***Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*
*Note: Percentage is to the nearest decimal point.*

Figure 2.1.1 Age group (years) distribution for patients with ACS, Malaysia 2006

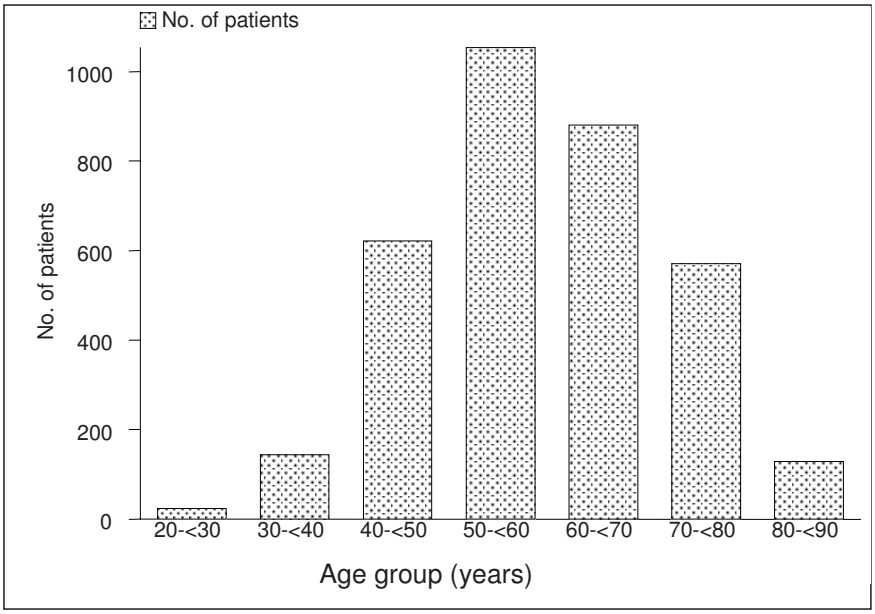



Figure 2.1.2 Gender distribution for patients with ACS, Malaysia 2006

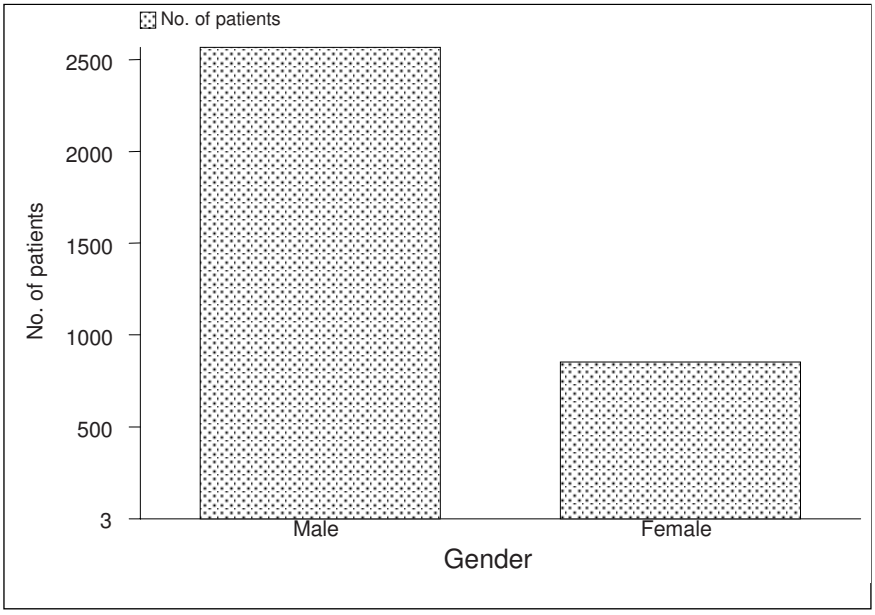


Figure 2.1.3 Ethnic group distribution for patients with ACS, Malaysia 2006

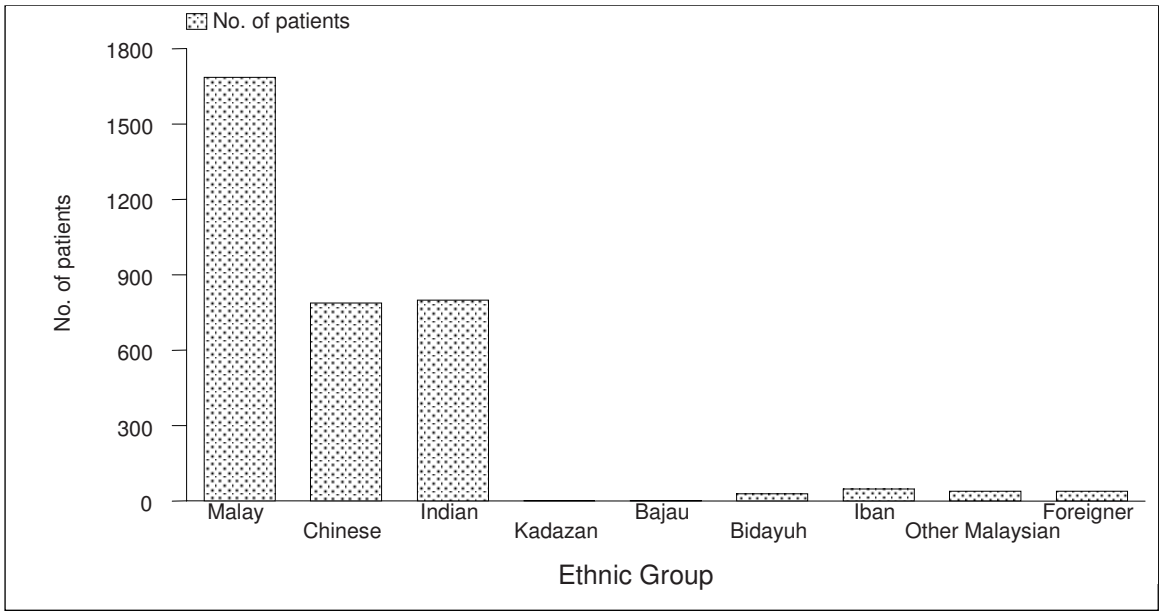
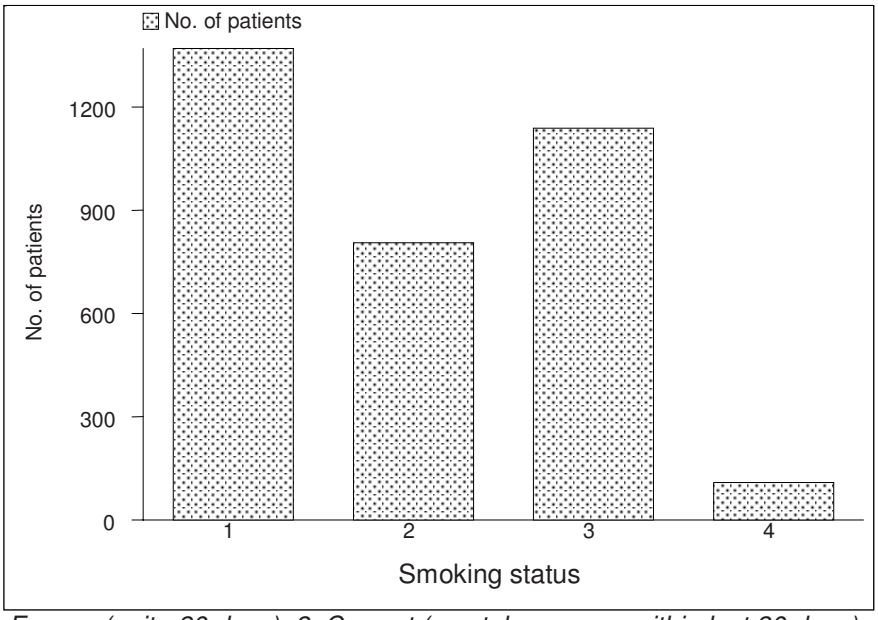



Figure 2.1.4 Smoking status for patients with ACS, Malaysia 2006




*1. Never, 2. Former (quit >30 days), 3. Current (any tobacco use within last 30 days), 4. Unknown*

Figure 2.1.5 Family history of premature cardiovascular disease for patients with ACS, Malaysia 2006

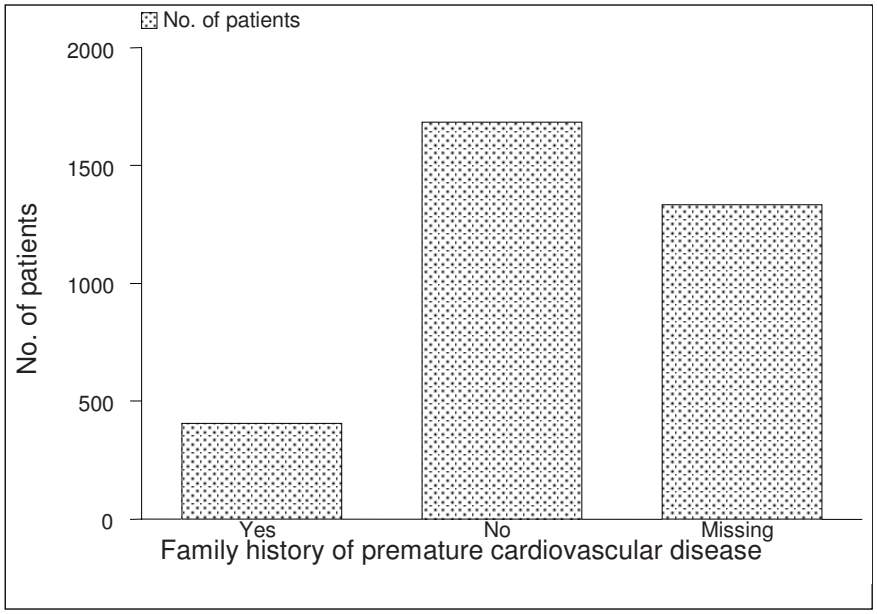



Figure 2.1.6 BMI for patients with ACS, Malaysia 2006

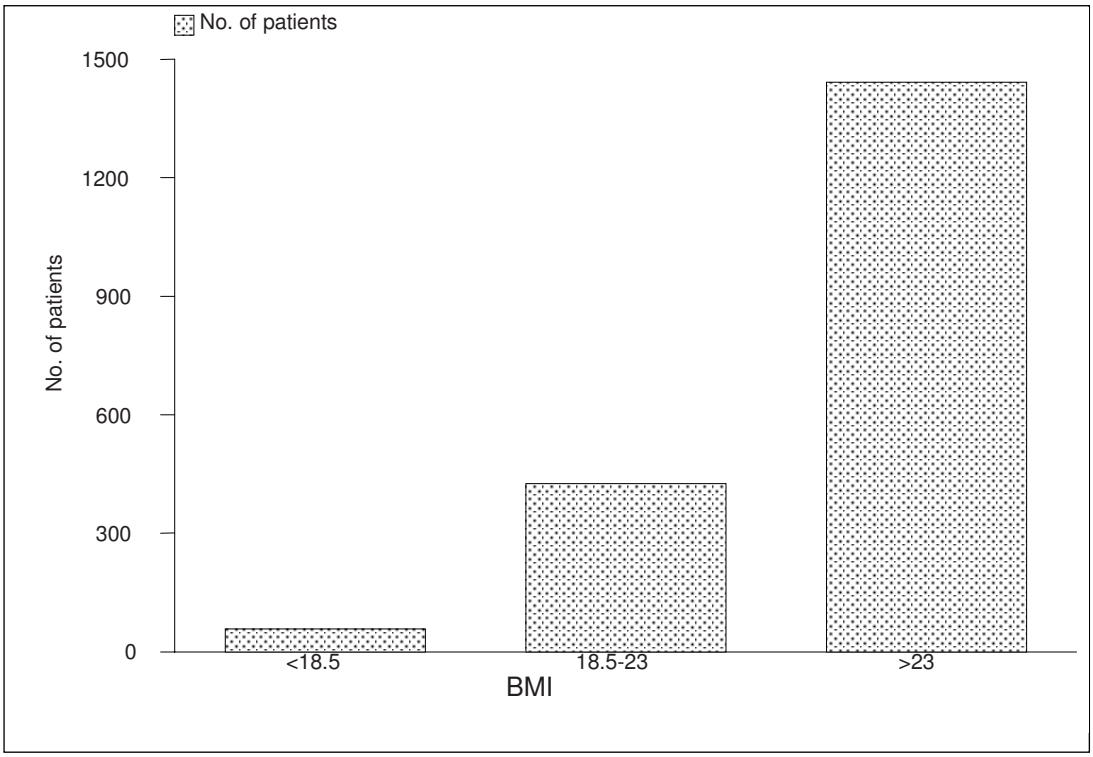


Figure 2.1.7 WHR for patients with ACS, Malaysia 2006

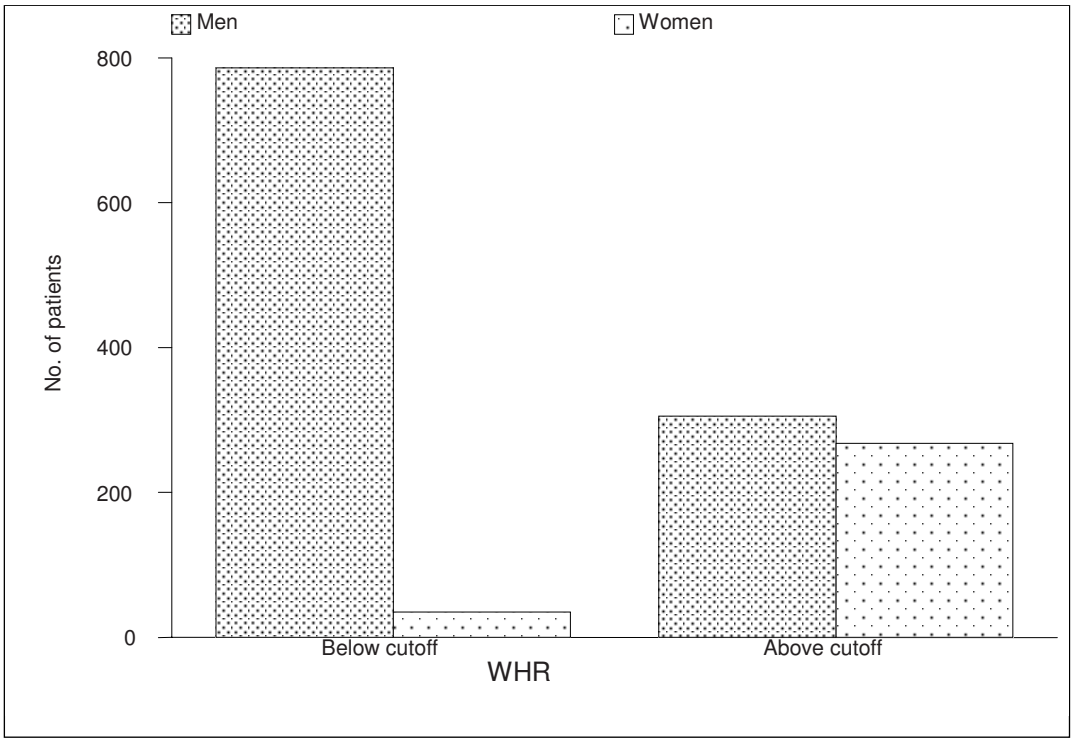



Figure 2.1.8 Waist circumference (cm) for patients with ACS, Malaysia 2006

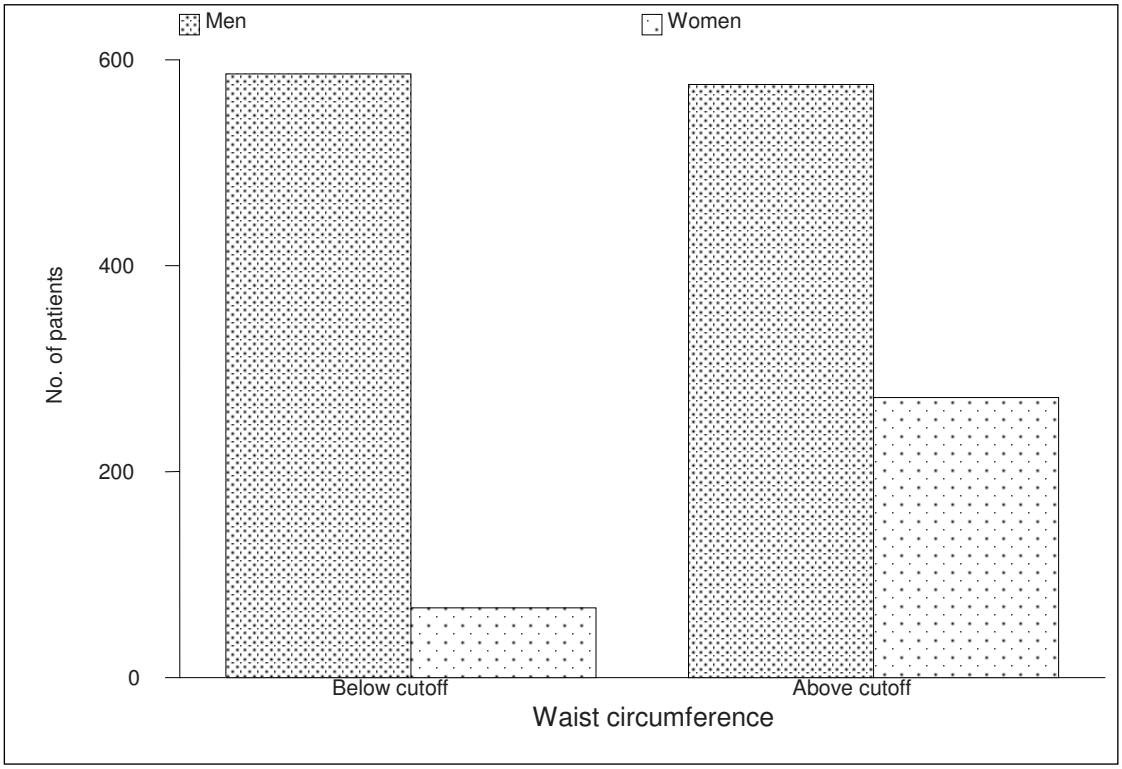
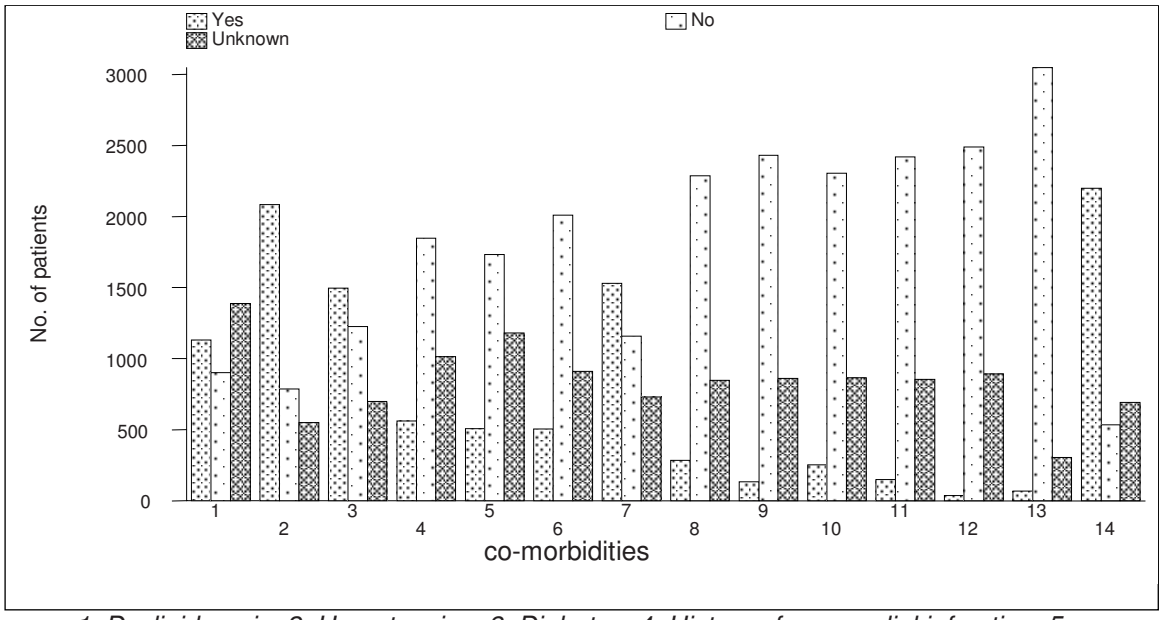


Figure 2.1.9 Co-morbidities for patients with ACS, Malaysia 2006




*1. Dyslipidaemia, 2. Hypertension, 3. Diabetes, 4. History of myocardial infarction, 5. Documented CAD > 50% stenosis, 6. Chronic angina (onset more than 2 weeks ago), 7. New onset angina (less than 2 weeks), 8. Heart failure, 9. Chronic lung disease, 10. Renal disease, 11. Cerebrovascular disease, 12. Peripheral vascular disease, 13. None of the above, 14. Coronary artery disease**

Table 2.2.1 Distribution of patients with ACS by SDP, Malaysia 2006

| | SDP | No. | % |
|---|---|---|---|
| 1 | University Malaya Medical Centre, Kuala Lumpur | 802 | 23 |
| 2 | National Heart Institute, Kuala Lumpur | 456 | 13 |
| 3 | Kuala Lumpur Hospital, Kuala Lumpur | 413 | 12 |
| 4 | Penang Hospital, Penang | 482 | 14 |
| 5 | Sarawak General Hospital, Sarawak | 375 | 11 |
| 6 | Sultanah Aminah Hospital, Johor | 242 | 7 |
| 7 | Sultanah Bahiyah Hospital, Kedah | 160 | 5 |
| 8 | Tuanku Ja'afar Hospital, Negeri Sembilan | 146 | 4 |
| 9 | Tuanku Fauziah Hospital, Perlis | 53 | 2 |
| 10 | Raja Perempuan Zainab II Hospital, Kelantan | 141 | 4 |
| 11 | Tengku Ampuan Afzan Hospital, Pahang | 152 | 4 |
| | **Total** | **3422** | **100** |

** Each SDP started to contribute data at different time*
*Note: Percentage is to the nearest decimal point.*

Figure 2.2.1 Distribution of patients with ACS by SDP, Malaysia 2006

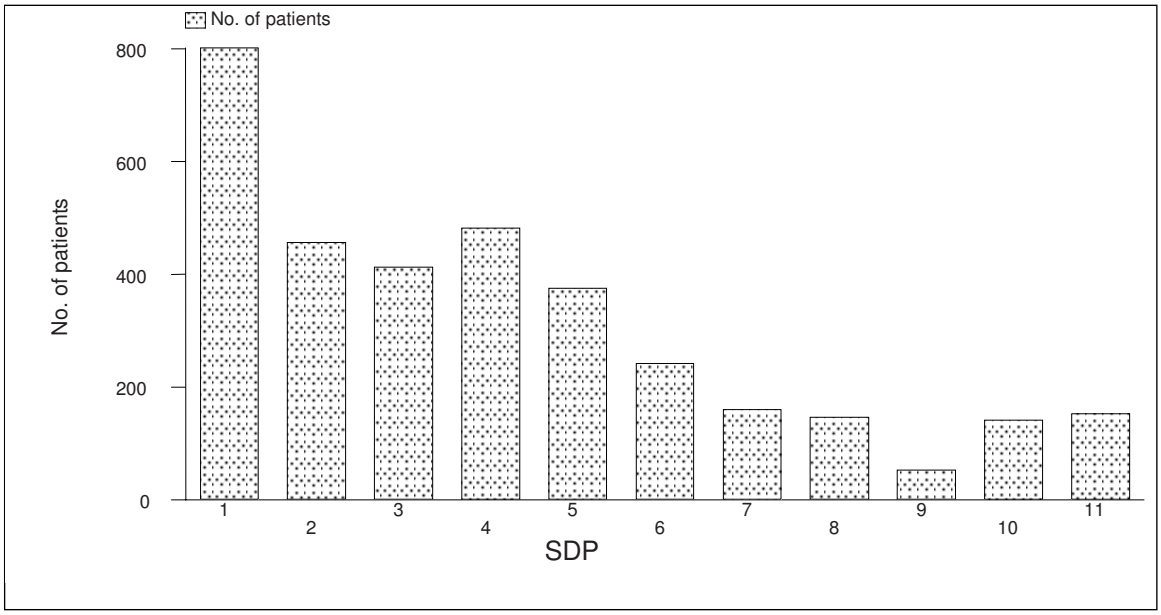


Table 2.2.2 SDP-ethnicity distribution of patients with ACS, Malaysia 2006 (row percent)

| | SDP | Ethnic group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Malay | | Chinese | | Indian | | Others* | | Total | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % |
| 1 | University Malaya Medical Centre | 264 | 33 | 180 | 22 | 335 | 42 | 23 | 3 | 802 | 100 |
| 2 | National Heart Institute | 216 | 47 | 85 | 19 | 141 | 31 | 14 | 3 | 456 | 100 |
| 3 | Kuala Lumpur Hospital | 223 | 54 | 74 | 18 | 91 | 22 | 25 | 6 | 413 | 100 |
| 4 | Penang Hospital | 190 | 39 | 172 | 36 | 113 | 23 | 7 | 1 | 482 | 100 |
| 5 | Sarawak General Hospital | 141 | 38 | 151 | 40 | 4 | 1 | 79 | 21 | 375 | 100 |
| 6 | Sultanah Aminah Hospital | 128 | 53 | 66 | 27 | 46 | 19 | 2 | 1 | 242 | 100 |
| 7 | Sultanah Bahiyah Hospital | 145 | 91 | 7 | 4 | 7 | 4 | 1 | 1 | 160 | 100 |
| 8 | Tuanku Ja'afar Hospital | 71 | 49 | 23 | 16 | 52 | 36 | 0 | 0 | 146 | 100 |
| 9 | Tuanku Fauziah Hospital | 49 | 92 | 1 | 2 | 2 | 4 | 1 | 2 | 53 | 100 |
| 10 | Raja Perempuan Zainab II Hospital | 134 | 95 | 7 | 5 | 0 | 0 | 0 | 0 | 141 | 100 |
| 11 | Tengku Ampuan Afzan Hospital | 123 | 81 | 20 | 13 | 8 | 5 | 1 | 1 | 152 | 100 |

**Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

*Note: Percentage is to the nearest decimal point.*

Figure 2.2.2 SDP-ethnicity distribution of patients with ACS, Malaysia 2006

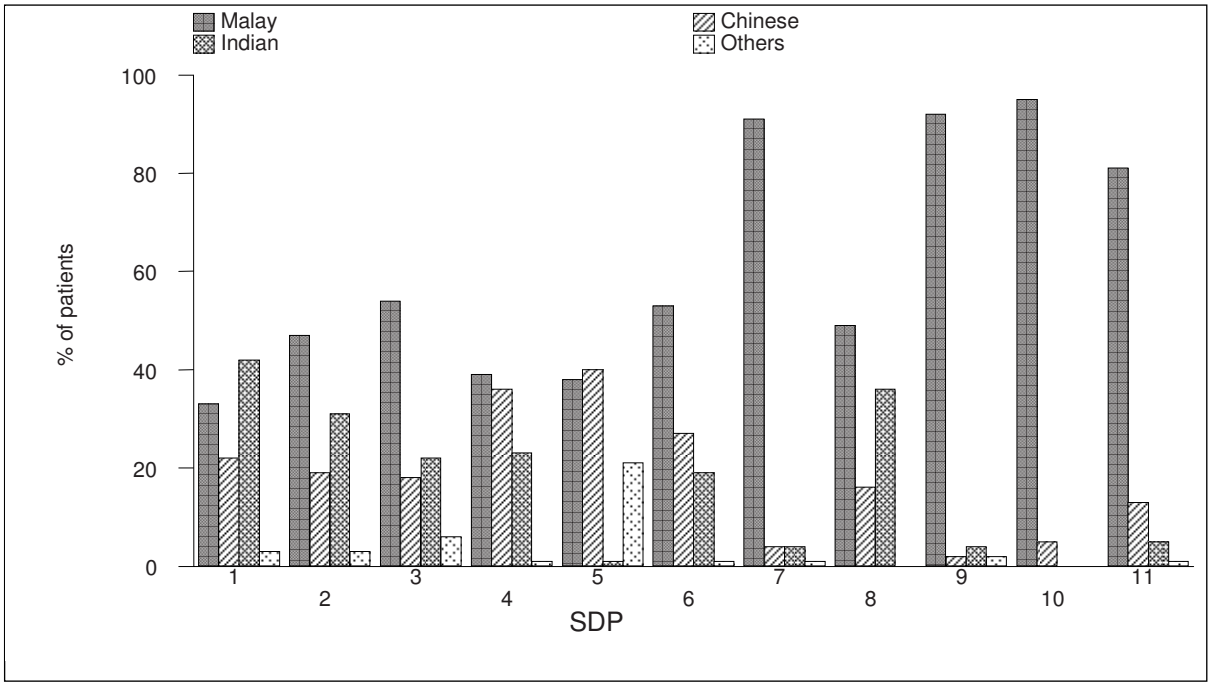


Table 2.2.3: SDP-ethnicity distribution of patients' admitted to participating sites, Malaysia 2006 (row percent)

| | SDP | Ethnic group | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Malay | | Chinese | | Indian | | Others* | | Total | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % |
| 1 | University Malaya Medical Centre | 16657 | 41 | 11576 | 29 | 9826 | 24 | 2336 | 6 | 40395 | 100 |
| 2 | National Heart Institute | 5357 | 51 | 2096 | 20 | 2447 | 23 | 534 | 5 | 10434 | 100 |
| 3 | Kuala Lumpur Hospital | 7739 | 67 | 691 | 6 | 1565 | 13 | 1605 | 14 | 11600 | 100 |
| 4 | Penang Hospital | 18162 | 42 | 16615 | 39 | 6218 | 14 | 1916 | 4 | 42911 | 100 |
| 5 | Sarawak General Hospital | 12218 | 37 | 8156 | 25 | 92 | 0 | 12641 | 38 | 33109 | 100 |
| 6 | Sultanah Aminah Hospital | 37248 | 58 | 14125 | 22 | 7735 | 12 | 5485 | 8 | 64593 | 100 |
| 7 | Sultanah Bahiyah Hospital | 14381 | 82 | 1857 | 11 | 628 | 4 | 626 | 4 | 17492 | 100 |
| 8 | Tuanku Ja'afar Hospital | 23083 | 53 | 7571 | 17 | 10690 | 24 | 2306 | 5 | 43650 | 100 |
| 9 | Tuanku Fauziah Hospital | 23221 | 89 | 1505 | 6 | 353 | 1 | 919 | 4 | 25998 | 100 |
| 10 | Raja Perempuan Zainab II Hospital | 37716 | 94 | 1220 | 3 | 91 | 0 | 1095 | 3 | 40122 | 100 |
| 11 | Tengku Ampuan Afzan Hospital | 25112 | 78 | 3986 | 12 | 1363 | 4 | 1680 | 5 | 32141 | 100 |

*+ Patients age > 20 years old only*
**Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*
*Note: Percentage is to the nearest decimal point.*

Figure 2.2.3: SDP-ethnicity distribution of patients' admitted to participating sites, Malaysia 2006

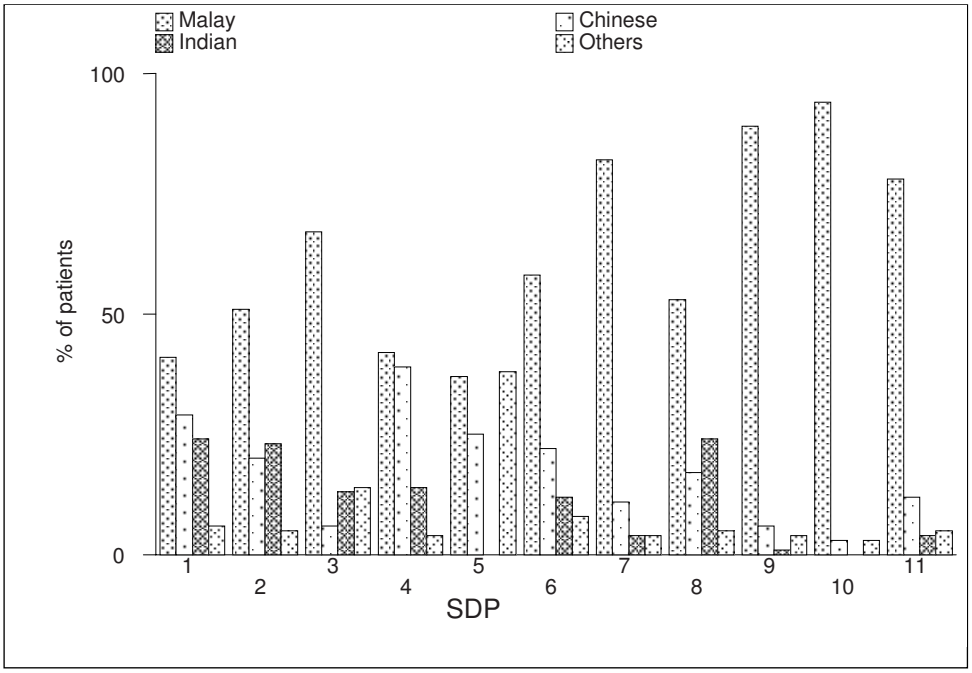


Table 2.2.4 SDP-gender distribution of patients with ACS, Malaysia 2006 (row percent)

| | SDP | Gender | | | | | |
|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Total | |
| | | No. | % | No. | % | No. | % |
| 1 | University Malaya Medical Centre | 588 | 73 | 214 | 27 | 802 | 100 |
| 2 | National Heart Institute | 357 | 78 | 99 | 22 | 456 | 100 |
| 3 | Kuala Lumpur Hospital | 329 | 80 | 84 | 20 | 413 | 100 |
| 4 | Penang Hospital | 366 | 76 | 116 | 24 | 482 | 100 |
| 5 | Sarawak General Hospital | 263 | 70 | 112 | 30 | 375 | 100 |
| 6 | Sultanah Aminah Hospital | 212 | 88 | 30 | 12 | 242 | 100 |
| 7 | Sultanah Bahiyah Hospital | 103 | 64 | 57 | 36 | 160 | 100 |
| 8 | Tuanku Ja'afar Hospital | 77 | 53 | 69 | 47 | 146 | 100 |
| 9 | Tuanku Fauziah Hospital | 45 | 85 | 8 | 15 | 53 | 100 |
| 10 | Raja Perempuan Zainab II Hospital | 109 | 77 | 32 | 23 | 141 | 100 |
| 11 | Tengku Ampuan Afzan Hospital | 120 | 79 | 32 | 21 | 152 | 100 |

*Note: Percentage is to the nearest decimal point.*

Figure 2.2.4 SDP-gender distribution of patients with ACS, Malaysia 2006

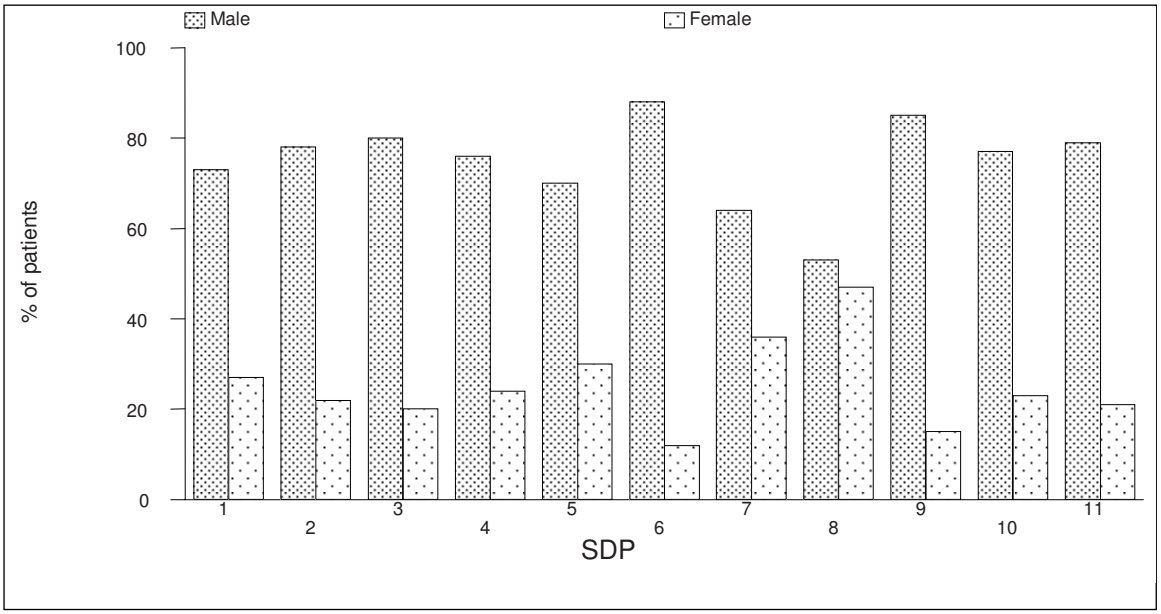


Table 2.2.5: SDP-gender distribution of patients admitted to participating sites, Malaysia 2006 (row percent)

| | SDP | Gender | | | | | |
|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Total | |
| | | No. | % | No. | % | No. | % |
| 1 | University Malaya Medical Centre | 16233 | 40 | 24350 | 60 | 40395 | 100 |
| 2 | National Heart Institute | 3134 | 30 | 7300 | 70 | 10434 | 100 |
| 3 | Kuala Lumpur Hospital | 3970 | 34 | 7630 | 66 | 11600 | 100 |
| 4 | Penang Hospital | 19382 | 45 | 23529 | 55 | 42911 | 100 |
| 5 | Sarawak General Hospital | 9704 | 29 | 23405 | 71 | 33109 | 100 |
| 6 | Sultanah Aminah Hospital | 22690 | 35 | 41903 | 65 | 64593 | 100 |
| 7 | Sultanah Bahiyah Hospital | 6368 | 36 | 11124 | 64 | 17492 | 100 |
| 8 | Tuanku Ja'afar Hospital | 15202 | 35 | 28448 | 65 | 43650 | 100 |
| 9 | Tuanku Fauziah Hospital | 11036 | 42 | 14962 | 58 | 25998 | 100 |
| 10 | Raja Perempuan Zainab II Hospital | 14312 | 36 | 25810 | 64 | 40122 | 100 |
| 11 | Tengku Ampuan Afzan Hospital | 11532 | 36 | 20609 | 64 | 32141 | 100 |

[+] *Patients age > 20 years old only*

*Note: Percentage is to the nearest decimal point.*

Figure 2.2.5: SDP-gender distribution of patients admitted to participating sites, Malaysia 2006

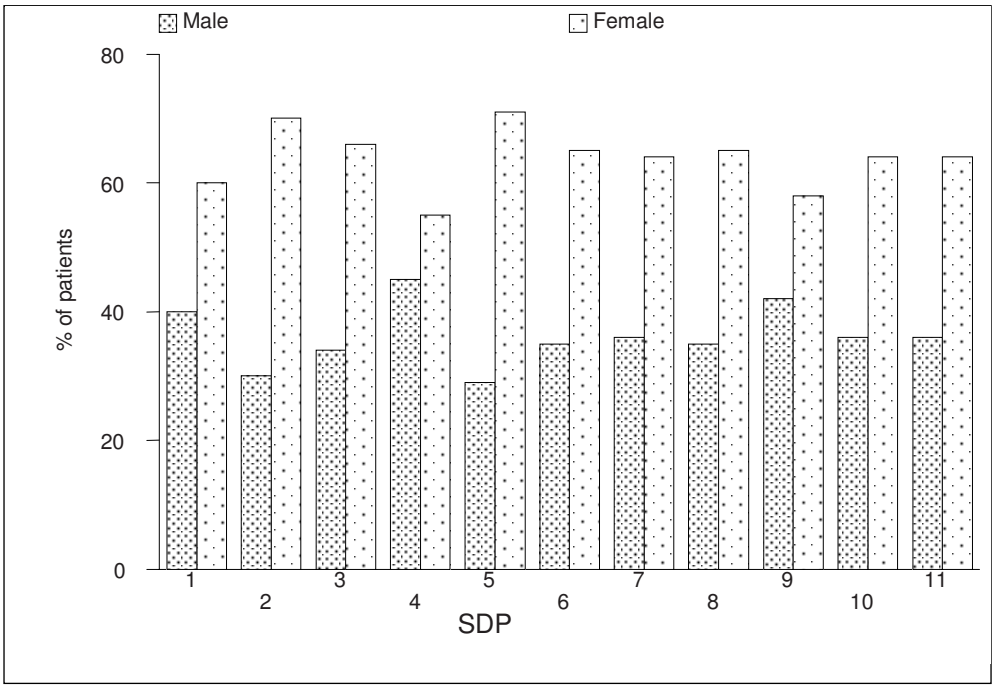


Table 2.3 Age-gender distribution for patients with ACS, Malaysia 2006

| Age group | Gender | | | |
|---|---|---|---|---|
| | Male | | Female | |
| | No. | % | No. | % |
| 20 - <30 | 22 | 1 | 1 | 0 |
| 30 - <40 | 131 | 5 | 12 | 1 |
| 40 - <50 | 541 | 21 | 80 | 9 |
| 50 - <60 | 888 | 35 | 166 | 19 |
| 60 - <70 | 616 | 24 | 265 | 31 |
| 70 - <80 | 306 | 12 | 265 | 31 |
| ≥80 | 65 | 3 | 64 | 8 |
| **Total** | **2569** | **100** | **853** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3 Age-gender distribution for patients with ACS, Malaysia 2006

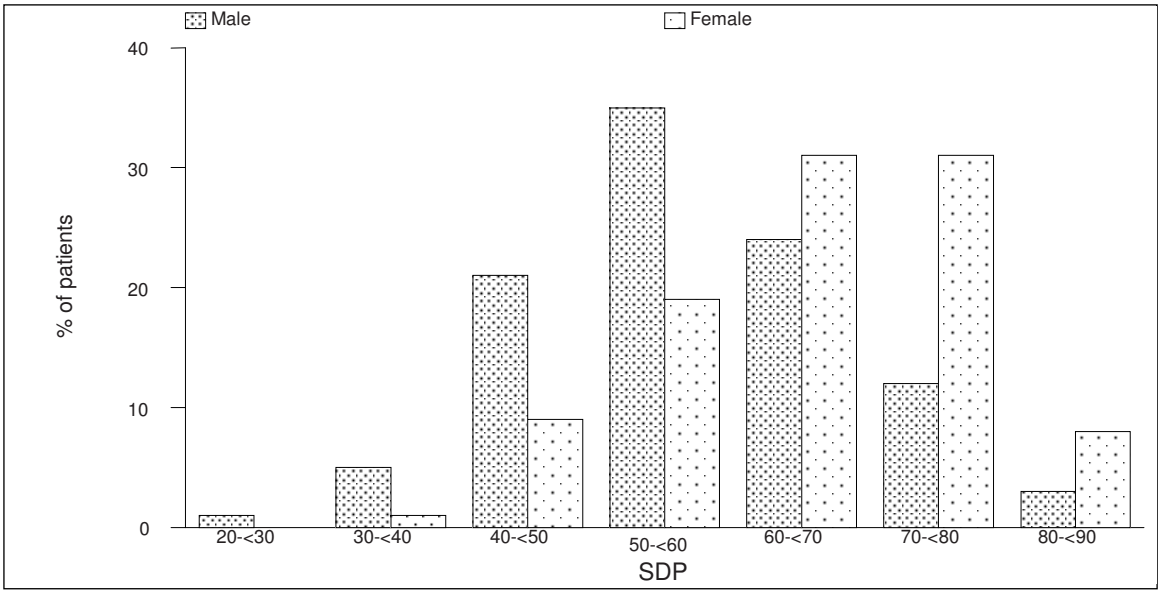


Table 2.3.1 Age-gender distribution for patients with ACS by ethnic group, Malaysia 2006

| Gender | Age group | Ethnic group | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Malay | | Chinese | | Indian | | Others* | |
| | | No. | % | No. | % | No. | % | No. | % |
| Men | 20 - <30 | 10 | 1 | 5 | 1 | 5 | 1 | 2 | 2 |
| | 30 - <40 | 67 | 5 | 25 | 4 | 28 | 5 | 11 | 9 |
| | 40 - <50 | 286 | 22 | 91 | 16 | 133 | 23 | 31 | 26 |
| | 50 - <60 | 445 | 34 | 183 | 33 | 227 | 39 | 33 | 28 |
| | 60 - <70 | 324 | 25 | 137 | 24 | 130 | 22 | 25 | 21 |
| | 70 - <80 | 148 | 11 | 95 | 17 | 48 | 8 | 15 | 13 |
| | ≥80 | 24 | 2 | 25 | 4 | 15 | 3 | 1 | 1 |
| | **Total** | **1304** | **100** | **561** | **100** | **586** | **100** | **118** | **100** |
| Women | 20 - <30 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 30 - <40 | 5 | 1 | 3 | 1 | 4 | 2 | 0 | 0 |
| | 40 - <50 | 41 | 11 | 7 | 3 | 32 | 15 | 0 | 0 |
| | 50 - <60 | 88 | 23 | 28 | 12 | 45 | 21 | 5 | 14 |
| | 60 - <70 | 117 | 31 | 68 | 30 | 62 | 29 | 18 | 51 |
| | 70 - <80 | 111 | 29 | 91 | 40 | 53 | 25 | 10 | 29 |
| | ≥80 | 17 | 4 | 28 | 12 | 17 | 8 | 2 | 6 |
| | **Total** | **380** | **100** | **225** | **100** | **213** | **100** | **35** | **100** |

**Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.1a Age-gender distribution male patients with ACS by ethnic group, Malaysia 2006

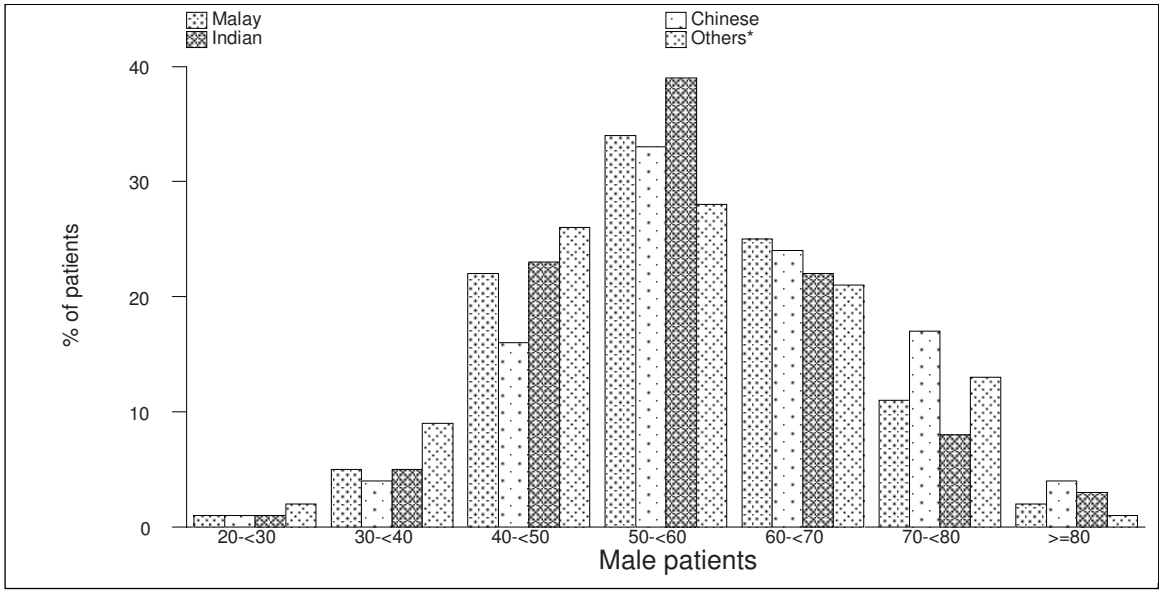


Figure 2.3.1b Age-gender distribution for female patients with ACS by ethnic group, Malaysia 2006

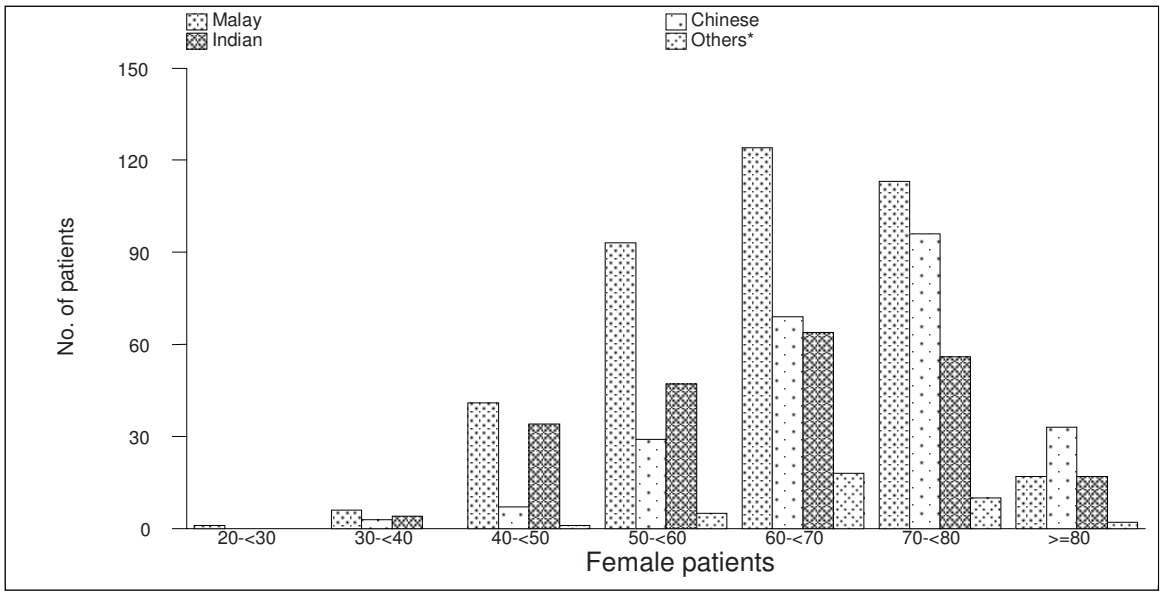


Table 2.3.2 Age-gender distribution for patients with ACS by pre-morbid diabetes, Malaysia 2006

| Gender | Age group | Pre-morbid diabetes | | | | | |
|---|---|---|---|---|---|---|---|
| | | Diabetic | | Non-diabetic | | Not known | |
| | | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 1 | 0 | 15 | 2 | 6 | 1 |
| | 30 - <40 | 31 | 3 | 58 | 6 | 42 | 7 |
| | 40 - <50 | 194 | 19 | 212 | 22 | 135 | 23 |
| | 50 - <60 | 402 | 39 | 291 | 30 | 195 | 33 |
| | 60 - <70 | 262 | 26 | 224 | 23 | 130 | 22 |
| | 70 - <80 | 114 | 11 | 129 | 13 | 63 | 11 |
| | ≥80 | 18 | 2 | 32 | 3 | 15 | 3 |
| | **Total** | **1022** | **100** | **961** | **100** | **586** | **100** |
| Female | 20 - <30 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 30 - <40 | 5 | 1 | 3 | 1 | 4 | 4 |
| | 40 - <50 | 44 | 9 | 23 | 9 | 13 | 12 |
| | 50 - <60 | 97 | 20 | 45 | 17 | 24 | 21 |
| | 60 - <70 | 149 | 31 | 83 | 31 | 33 | 29 |
| | 70 - <80 | 154 | 32 | 86 | 32 | 25 | 22 |
| | ≥80 | 26 | 5 | 25 | 9 | 13 | 12 |
| | **Total** | **475** | **100** | **265** | **100** | **113** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.2a Age-gender distribution for male patients with ACS by pre-morbid diabetes, Malaysia 2006

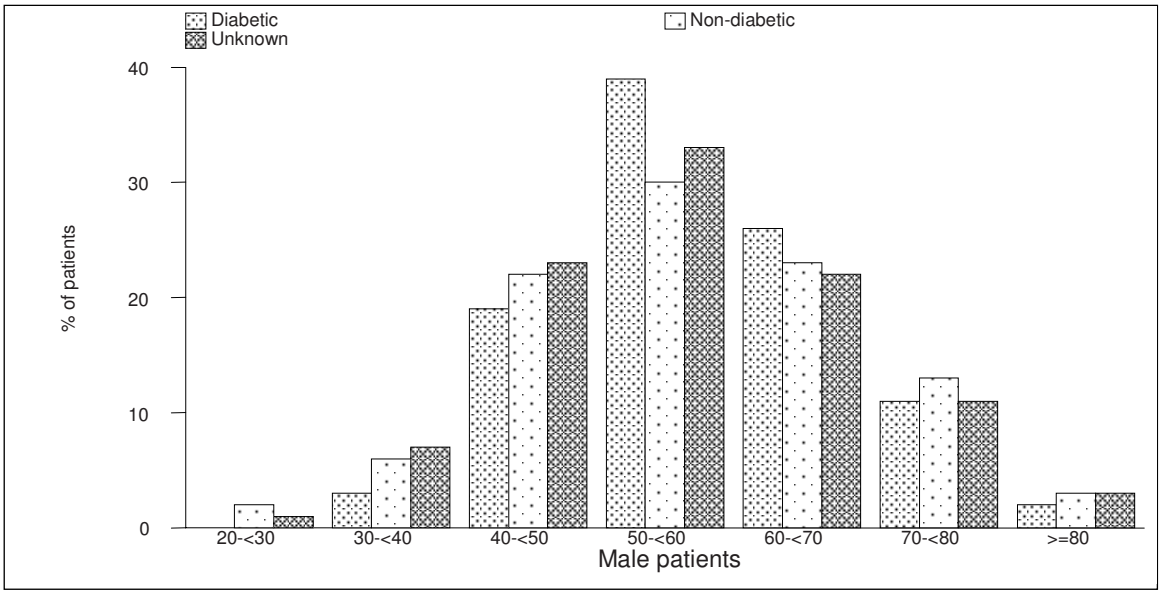


Figure 2.3.2b Age-gender distribution for female patients with ACS by pre-morbid diabetes, Malaysia 2006

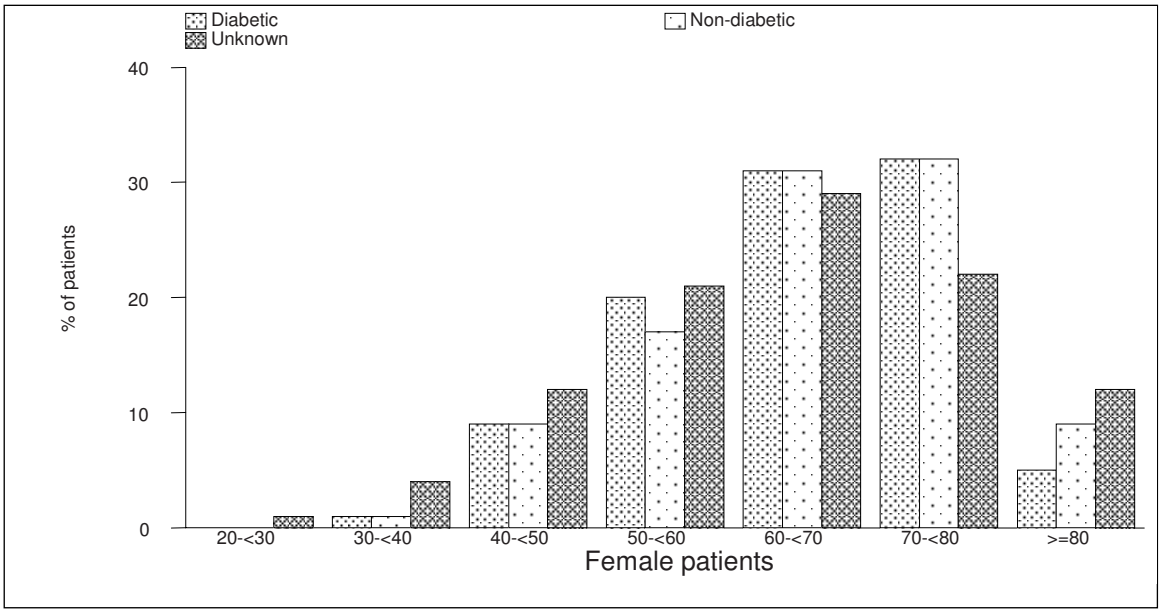


Table 2.3.3 Age-gender distribution for patients with ACS by pre-morbid hypertension, Malaysia 2006

| Gender | Age group | Pre-morbid hypertension | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hypertensive | | Non-hypertensive | | Not known | |
| | | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 2 | 0 | 15 | 2 | 5 | 1 |
| | 30 - <40 | 37 | 3 | 55 | 8 | 39 | 8 |
| | 40 - <50 | 235 | 17 | 178 | 26 | 128 | 27 |
| | 50 - <60 | 514 | 36 | 229 | 34 | 145 | 31 |
| | 60 - <70 | 394 | 28 | 125 | 18 | 97 | 21 |
| | 70 - <80 | 197 | 14 | 63 | 9 | 46 | 10 |
| | ≥80 | 39 | 3 | 16 | 2 | 10 | 2 |
| | **Total** | **1418** | **100** | **681** | **100** | **470** | **100** |
| Female | 20 - <30 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 30 - <40 | 5 | 1 | 3 | 3 | 4 | 5 |
| | 40 - <50 | 52 | 8 | 14 | 13 | 14 | 17 |
| | 50 - <60 | 129 | 19 | 23 | 22 | 14 | 17 |
| | 60 - <70 | 214 | 32 | 32 | 30 | 19 | 23 |
| | 70 - <80 | 212 | 32 | 27 | 26 | 26 | 32 |
| | ≥80 | 54 | 8 | 6 | 6 | 4 | 5 |
| | **Total** | **666** | **100** | **105** | **100** | **82** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.3a Age-gender distribution for male patients with ACS by pre-morbid hypertension, Malaysia 2006

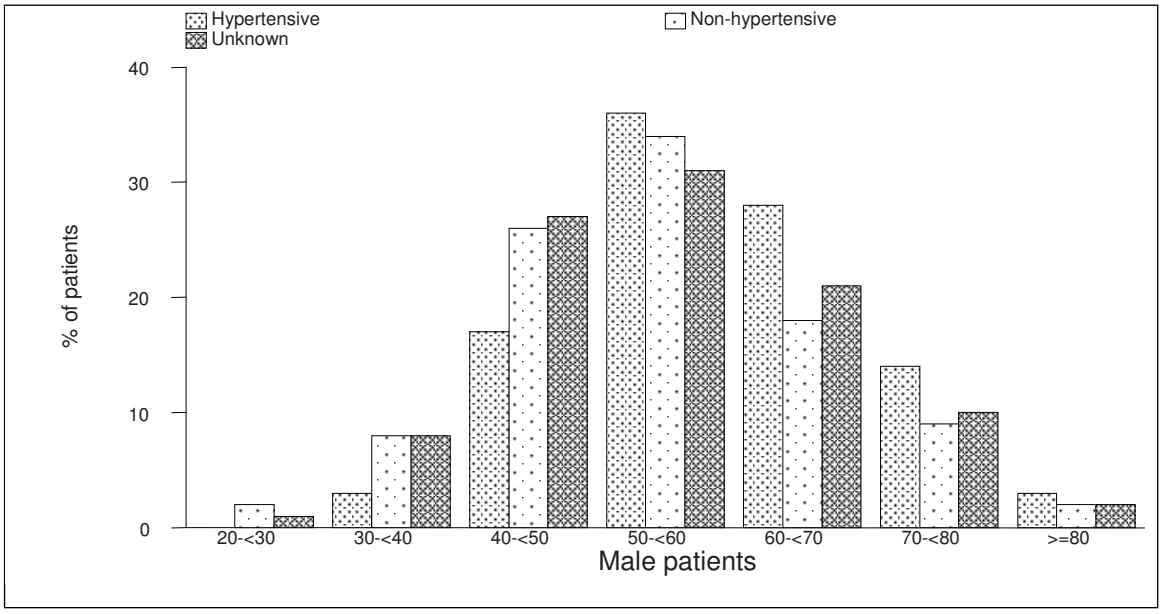


Figure 2.3.3b Age-gender distribution for female patients with ACS by pre-morbid hypertension, Malaysia 2006

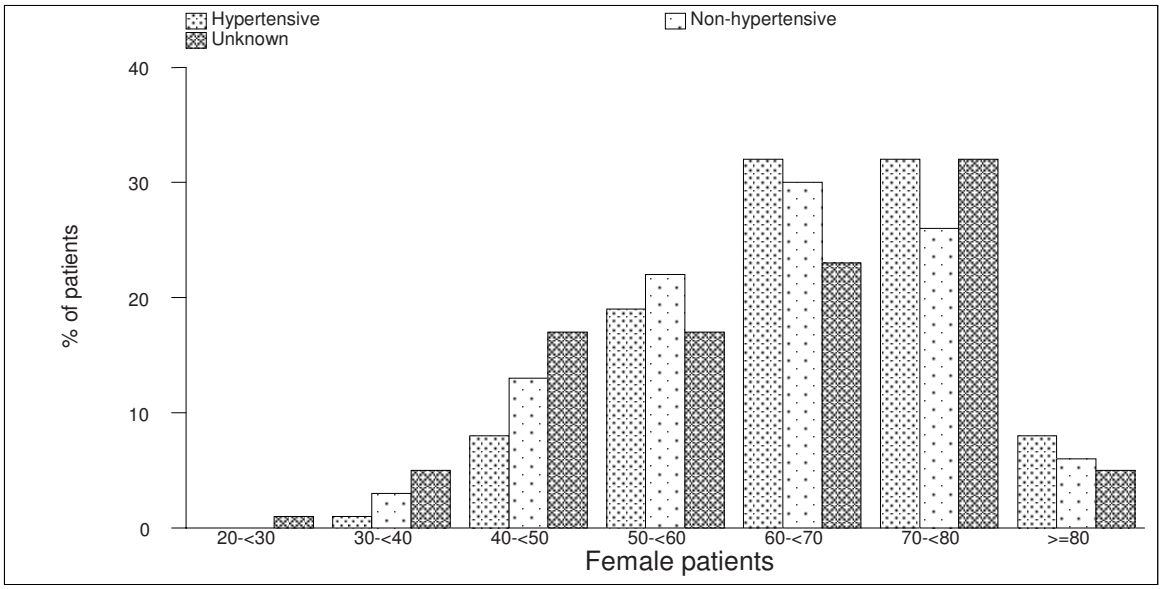


Table 2.3.4 Age-gender distribution for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

| Gender | Age group | Pre-morbid dyslipidaemia | | | | | |
|---|---|---|---|---|---|---|---|
| | | Yes | | No | | Not known | |
| | | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 2 | 0 | 11 | 2 | 9 | 1 |
| | 30 - <40 | 28 | 4 | 44 | 6 | 59 | 5 |
| | 40 - <50 | 145 | 18 | 152 | 22 | 244 | 23 |
| | 50 - <60 | 270 | 34 | 229 | 33 | 389 | 36 |
| | 60 - <70 | 239 | 30 | 140 | 20 | 237 | 22 |
| | 70 - <80 | 98 | 12 | 91 | 13 | 117 | 11 |
| | ≥80 | 15 | 2 | 22 | 3 | 28 | 3 |
| | **Total** | **797** | **100** | **689** | **100** | **1083** | **100** |
| Female | 20 - <30 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 30 - <40 | 2 | 1 | 1 | 0 | 9 | 3 |
| | 40 - <50 | 27 | 8 | 24 | 11 | 29 | 9 |
| | 50 - <60 | 66 | 20 | 48 | 23 | 52 | 17 |
| | 60 - <70 | 108 | 32 | 64 | 30 | 93 | 30 |
| | 70 - <80 | 116 | 35 | 54 | 25 | 95 | 31 |
| | ≥80 | 15 | 4 | 22 | 10 | 27 | 9 |
| | **Total** | **334** | **100** | **213** | **100** | **306** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.4a Age-gender distribution for male patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

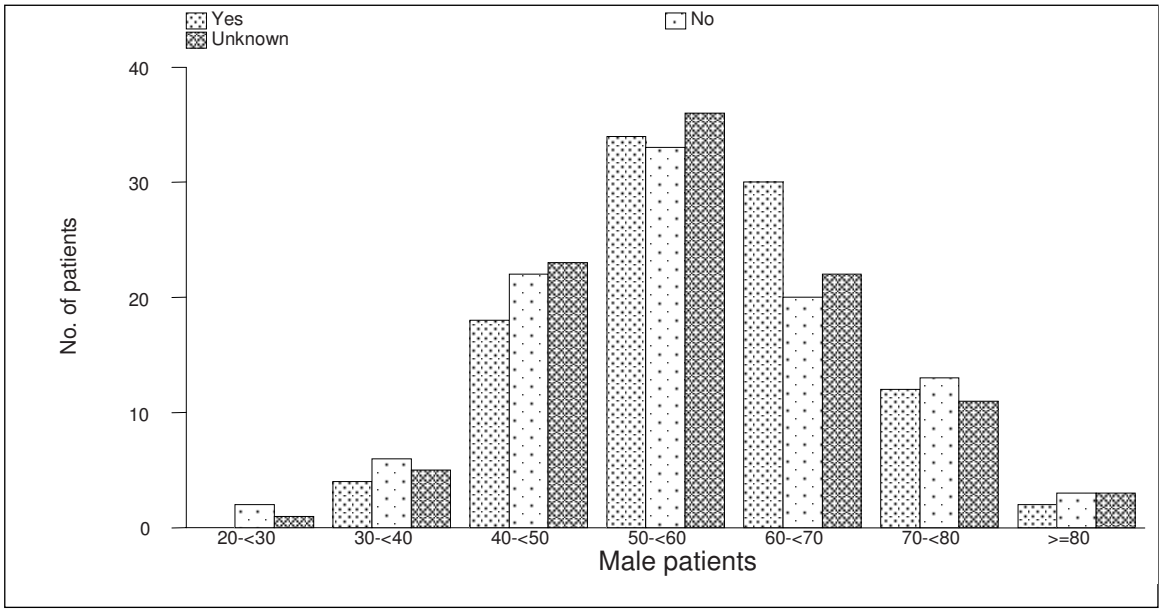


Figure 2.3.4b Age-gender distribution for female patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

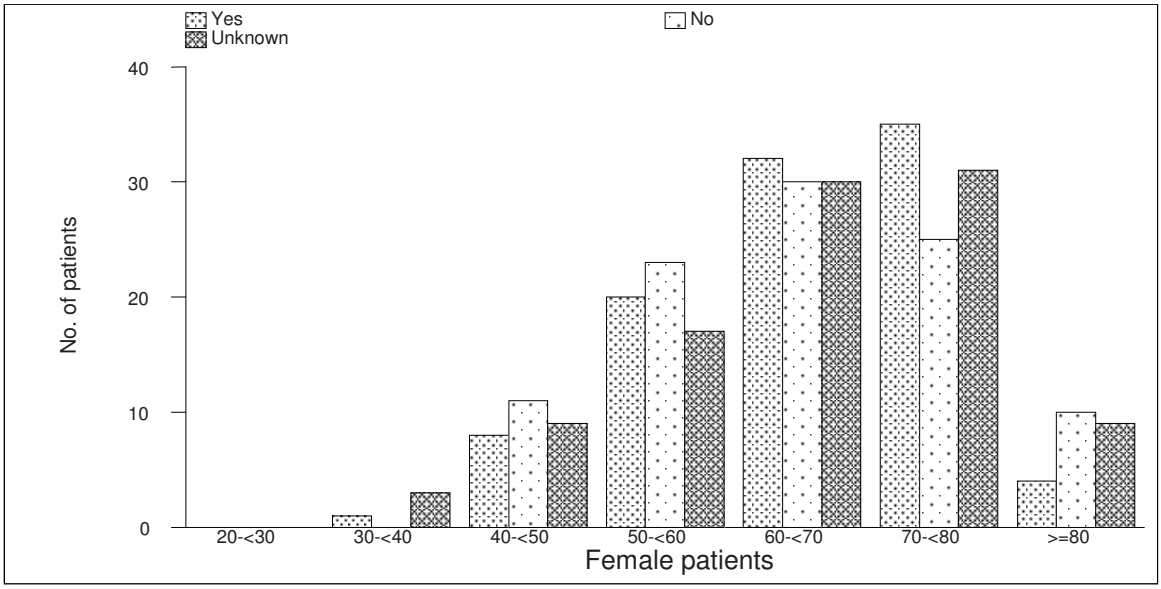


Table 2.3.5 Age-gender distribution for patients with ACS by family history, Malaysia 2006

| Gender | Age group | Family history of premature cardiovascular disease | | | | | |
|---|---|---|---|---|---|---|---|
| | | Yes | | No | | Not known | |
| | | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 3 | 1 | 13 | 1 | 6 | 1 |
| | 30 - <40 | 36 | 11 | 55 | 4 | 40 | 4 |
| | 40 - <50 | 93 | 28 | 250 | 20 | 198 | 20 |
| | 50 - <60 | 130 | 39 | 394 | 32 | 364 | 36 |
| | 60 - <70 | 58 | 17 | 310 | 25 | 248 | 25 |
| | 70 - <80 | 14 | 4 | 176 | 14 | 116 | 12 |
| | ≥80 | 2 | 1 | 37 | 3 | 26 | 3 |
| | **Total** | **336** | **100** | **1235** | **100** | **998** | **100** |
| Female | 20 - <30 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 30 - <40 | 2 | 3 | 2 | 0 | 8 | 2 |
| | 40 - <50 | 22 | 32 | 33 | 7 | 25 | 7 |
| | 50 - <60 | 14 | 21 | 86 | 19 | 66 | 20 |
| | 60 - <70 | 17 | 25 | 155 | 35 | 93 | 28 |
| | 70 - <80 | 12 | 18 | 138 | 31 | 115 | 34 |
| | ≥80 | 1 | 1 | 35 | 8 | 28 | 8 |
| | **Total** | **68** | **100** | **449** | **100** | **336** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.5a Age-gender distribution for male patients with ACS by family history, Malaysia 2006

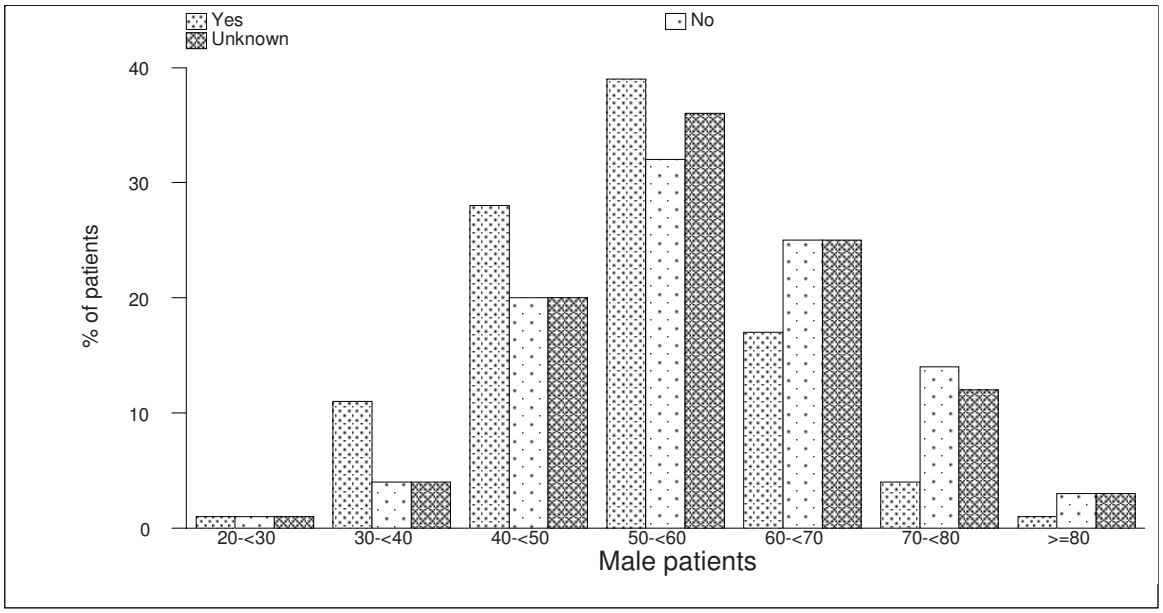


Figure 2.3.5b Age-gender distribution for female patients with ACS by family history, Malaysia 2006

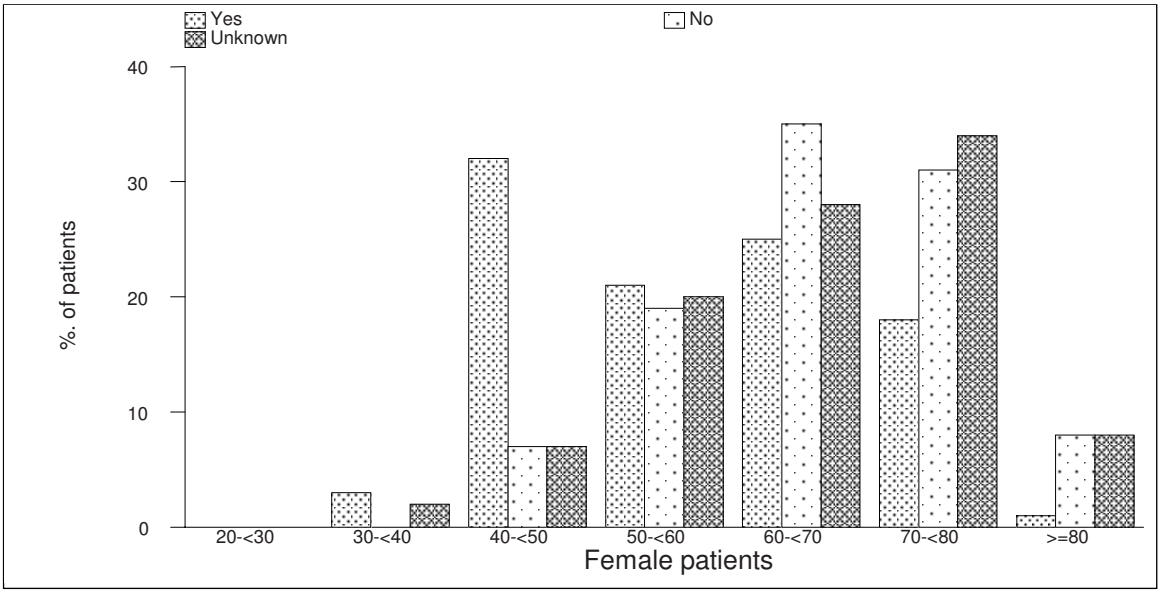


Table 2.3.6 Age-gender distribution for patients with ACS by smoking status, Malaysia 2006

| Gender | Age group | Smoking status | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Never | | Former (quit more than 30 days) | | Current (any tobacco use within last 30 days) | | Unknown | |
| | | No. | % | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 2 | 0 | 1 | 0 | 19 | 2 | 0 | 0 |
| | 30 - <40 | 12 | 2 | 19 | 3 | 97 | 9 | 3 | 3 |
| | 40 - <50 | 112 | 18 | 103 | 14 | 316 | 28 | 10 | 11 |
| | 50 - <60 | 205 | 33 | 249 | 33 | 397 | 36 | 37 | 43 |
| | 60 - <70 | 189 | 31 | 205 | 27 | 198 | 18 | 24 | 28 |
| | 70 - <80 | 82 | 13 | 138 | 18 | 75 | 7 | 11 | 13 |
| | ≥80 | 16 | 3 | 38 | 5 | 9 | 1 | 2 | 2 |
| | **Total** | **618** | **100** | **753** | **100** | **1111** | **100** | **87** | **100** |
| Female | 20 - <30 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 |
| | 30 - <40 | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 40 - <50 | 75 | 10 | 2 | 4 | 2 | 7 | 1 | 5 |
| | 50 - <60 | 148 | 20 | 6 | 12 | 5 | 19 | 7 | 32 |
| | 60 - <70 | 234 | 31 | 18 | 35 | 10 | 37 | 3 | 14 |
| | 70 - <80 | 229 | 30 | 17 | 33 | 8 | 30 | 11 | 50 |
| | ≥80 | 54 | 7 | 9 | 17 | 1 | 4 | 0 | 0 |
| | **Total** | **752** | **100** | **52** | **100** | **27** | **100** | **22** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.3.6a Age-gender distribution for male patients with ACS by smoking status, Malaysia 2006

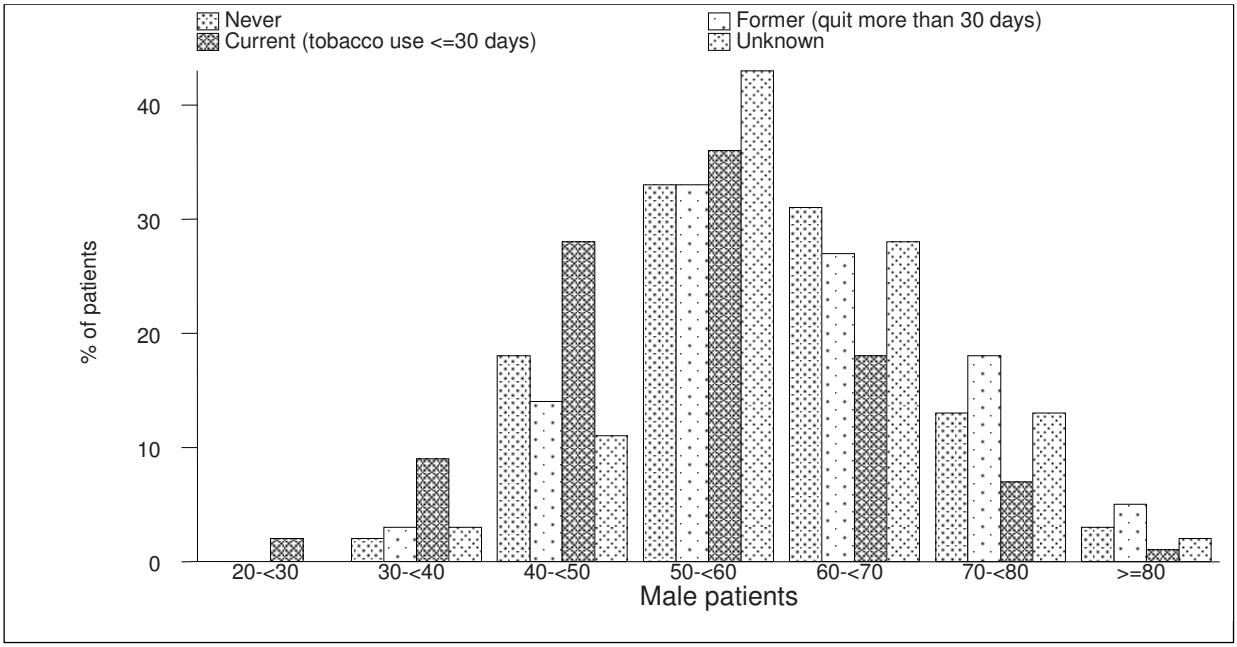


Figure 2.3.6b Age-gender distribution for female patients with ACS by smoking status, Malaysia 2006

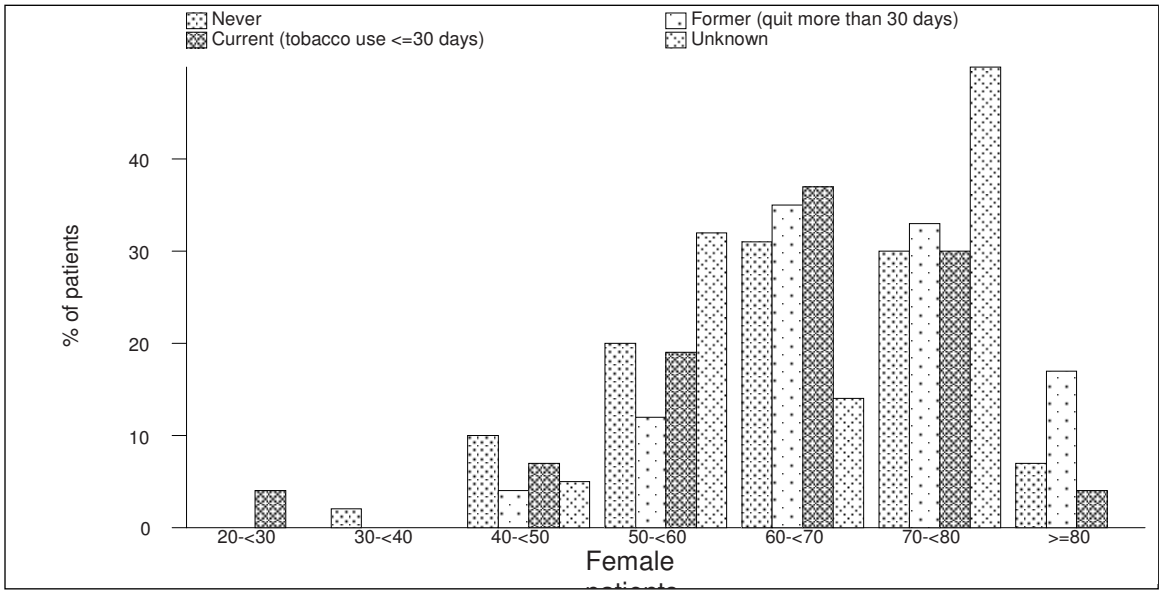


Table 2.4 Pre-morbid distribution for patients with ACS, Malaysia 2006

| | | Dyslipidaemia | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Yes | | | | | | No | | | | | | Not known | | | | | |
| | | Hypertension | | | | | | Hypertension | | | | | | Hypertension | | | | | |
| | | Yes | | No | | Unknown | | Yes | | No | | Unknown | | Yes | | No | | Unknown | |
| | | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Diabetes | Yes | 540 | 16 | 65 | 2 | 29 | 1 | 231 | 7 | 119 | 3 | 2 | 0 | 373 | 11 | 54 | 2 | 84 | 2 |
| | No | 280 | 8 | 104 | 3 | 1 | 0 | 241 | 7 | 296 | 9 | 0 | 0 | 163 | 5 | 121 | 4 | 20 | 1 |
| | Unknown | 73 | 2 | 2 | 0 | 37 | 1 | 8 | 0 | 3 | 0 | 2 | 0 | 175 | 5 | 22 | 1 | 377 | 11 |

*** The percentage is based on the grand total (N=3422)*

*Note: Percentage is to the nearest decimal point.*

Figure 2.4a Pre-morbid distribution for diabetic patients with ACS, Malaysia 2006

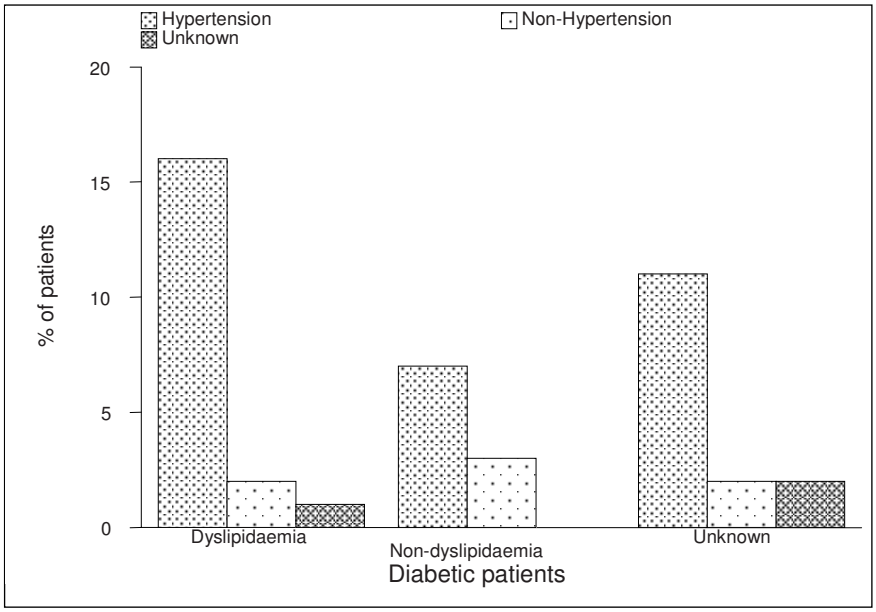


Figure 2.4b Pre-morbid distribution for non-diabetic patients with ACS, Malaysia 2006

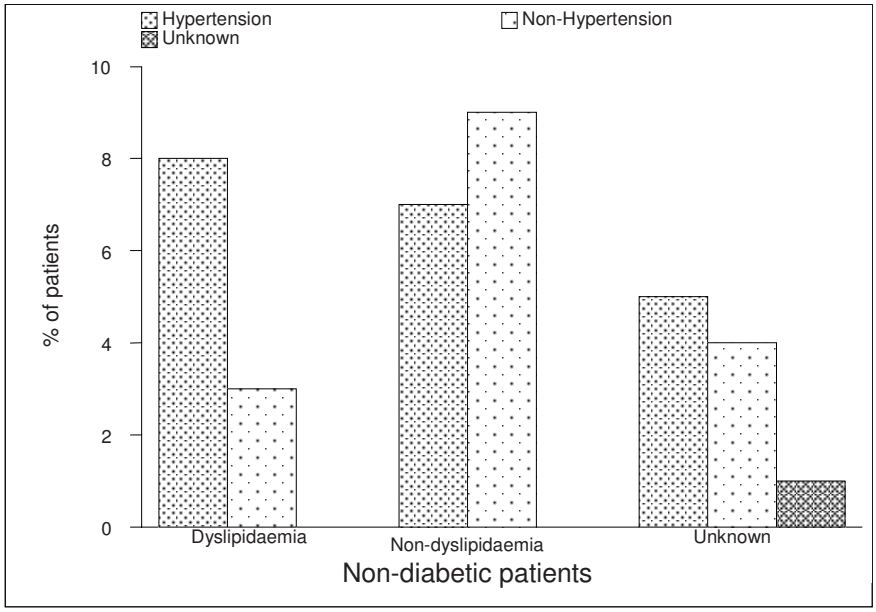



Table 2.5 Presence of cumulative risk factors

| Presence of cumulative Risk factors * | **Total=3422** | |
|---|---|---|
| | **No.** | **%** |
| None | 143 | 4 |
| 1 risk factor | 634 | 19 |
| 2 risk factor | 987 | 29 |
| 3 risk factor | 938 | 27 |
| > 3 risk factor | 720 | 21 |

** Risk factors are defined as presence of dyslipidaemia, hypertension, diabetes, family history of premature cardiovascular disease, smoking, and obesity.*

*Note: Percentage is to the nearest decimal point.*

Figure 2.5 Distribution of presence of cumulative risk factors

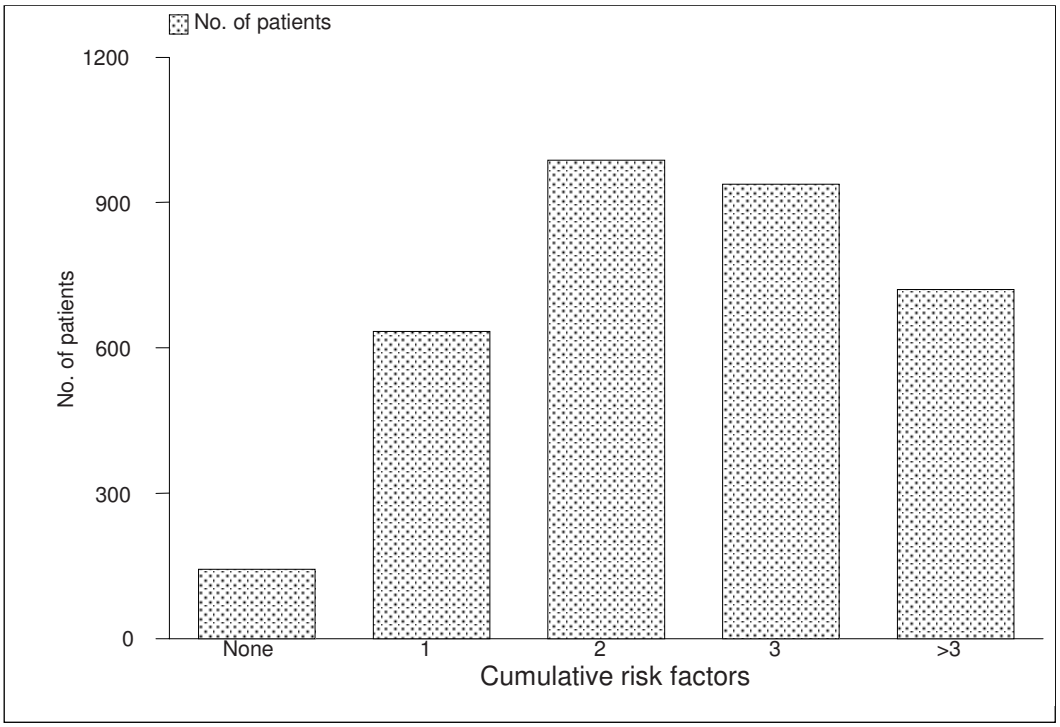


Table 2.6 Summary of type of cardiac presentation for patients with ACS, Malaysia 2006

| | **Total=**3422 |
|---|---|
| Acute coronary syndrome stratum, no. % | |
| • STEMI | 1445 (42) |
| • NSTEMI | 1132 (33) |
| • UA | 845 (25) |

*Note: Percentage is to the nearest decimal point.*

Figure 2.6 Stratum distribution for patients with ACS, Malaysia 2006

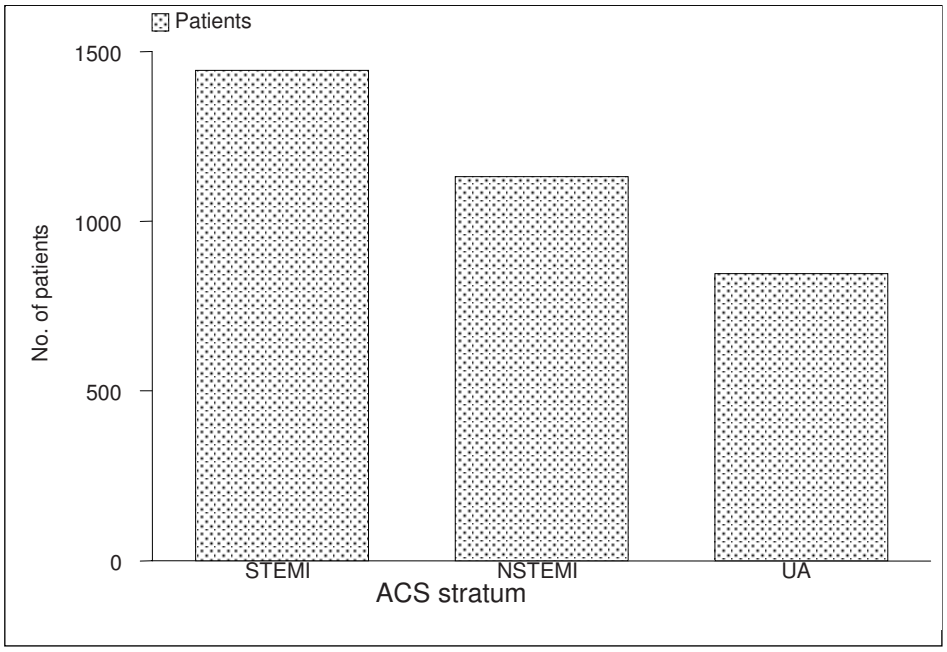


Table 2.7 Characteristics of patients with ACS by ACS stratum, Malaysia 2006

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| **1. DEMOGRAPHICS** | | | |
| 1.1 Age, years | | | |
| • Mean, SD | 56 (12) | 62 (11) | 60 (11) |
| • Median (min, max) | 56 (21, 93) | 63 (23, 100) | 60 (32, 92) |
| | | | |
| 1.2 Age group, no. % | | | |
| • 20 - <30 | 22 (2) | 1 (0) | 0 (0) |
| • 30 - <40 | 91 (6) | 27 (2) | 25 (3) |
| • 40 - <50 | 343 (24) | 139 (12) | 139 (16) |
| • 50 - <60 | 460 (32) | 330 (29) | 264 (31) |
| • 60 - <70 | 318 (22) | 334 (30) | 229 (27) |
| • 70 - <80 | 180 (12) | 244 (22) | 147 (17) |
| • ≥80 | 31 (2) | 57 (5) | 41 (5) |
| | | | |
| 1.3 Gender, no. % | | | |
| • Male | 1230 (85) | 779 (69) | 560 (66) |
| • Female | 215 (15) | 353 (31) | 285 (34) |
| | | | |
| 1.4 Ethnic group, no. % | | | |
| • Malay | 780 (54) | 514 (45) | 390 (46) |
| • Chinese | 301 (21) | 265 (23) | 220 (26) |
| • Indian | 286 (20) | 303 (27) | 210 (25) |
| • Orang Asli | 0 (0) | 0 (0) | 0 (0) |
| • Kadazan | 1 (0) | 1 (0) | 0 (0) |
| • Melanau | 0 (0) | 0 (0) | 0 (0) |
| • Murut | 0 (0) | 0 (0) | 0 (0) |
| • Bajau | 1 (0) | 0 (0) | 0 (0) |
| • Bidayuh | 16 (1) | 9 (1) | 3 (0) |
| • Iban | 21 (1) | 19 (2) | 8 (1) |
| • Other Malaysian | 12 (1) | 14 (1) | 11 (1) |
| • Foreigner | 27 (2) | 7 (1) | 3 (0) |
| | | | |
| **2. OTHER CORONARY RISK FACTORS** | | | |
| 2.1 Smoking, no. % | | | |
| • Never | 417 (29) | 551 (49) | 402 (48) |
| • Former (quit >30 days) | 272 (19) | 295 (26) | 238 (28) |
| • Current (any tobacco use within last 30 days) | 723 (50) | 259 (23) | 156 (18) |
| • Unknown | 33 (2) | 27 (2) | 49 (6) |
| | | | |
| 2.2 Family history of premature cardiovascular disease, no. % | | | |
| • Yes | 168 (12) | 127 (11) | 109 (13) |
| • No | 742 (51) | 550 (49) | 392 (46) |
| • Not known | 535 (37) | 455 (40) | 344 (41) |
| | | | |

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| 2.3 Antropometric | | | |
| BMI | | | |
| • N | 831 | 698 | 397 |
| • Mean, SD | 25.69 (4.27) | 25.45 (4.37) | 26.46 (4.81) |
| • Median, (min, max) | 25.14 (13.15, 60.39) | 25.05 (14.87, 59.94) | 25.806 (14.872, 45.986) |
| | | | |
| BMI, kg/m$^2$, no. % | | | |
| • <18.5 | 21 (3) | 24 (3) | 13 (3) |
| • 18.5-23 | 181 (22) | 174 (25) | 71 (18) |
| • > 23 | 629 (76) | 500 (72) | 313 (79) |
| | | | |
| WHR | | | |
| • N | 643 | 454 | 297 |
| • Mean, SD | 0.97 (0.08) | 0.97 (0.09) | 0.96 (0.10) |
| • Median, (min, max) | 0.96 (0.54, 1.63) | 0.96 (0.67, 1.61) | 0.96 (0.46, 1.85) |
| | | | |
| WHR, no. % | | | |
| • Men | 550 | 329 | 212 |
| • ≤ 1.0 | 405 (74) | 230 (70) | 151 (71) |
| • >1.0 | 145 (26) | 99 (30) | 61 (29) |
| • Women | 93 | 125 | 85 |
| • ≤ 0.85 | 9 (10) | 18 (14) | 8 (9) |
| • >0.85 | 84 (90) | 107 (86) | 77 (91) |
| | | | |
| Waist circumference, cm | | | |
| • N | 690 | 494 | 318 |
| • Mean, SD | 88.8 (14.1) | 89.6 (14.9) | 91.7 (14.1) |
| • Median, (min, max) | 90.0 (36.0, 131.0) | 90.0 (36.0, 160.0) | 92.0 (37.5, 152.0) |
| | | | |
| Waist circumference, cm, no. % | | | |
| • Men | 592 | 350 | 220 |
| • ≤ 90 | 307 (52) | 184 (53) | 95 (43) |
| • > 90 | 285 (48) | 166 (47) | 125 (57) |
| • Women | 98 | 144 | 98 |
| • ≤ 80 | 20 (20) | 30 (21) | 18 (18) |
| • > 80 | 78 (80) | 114 (79) | 80 (82) |
| | | | |
| 2.4 Co-morbidity | | | |
| Dyslipidaemia, no. % | | | |
| • Yes | 278 (19) | 464 (41) | 389 (46) |
| • No | 458 (32) | 247 (22) | 197 (23) |
| • Not known | 709 (49) | 421 (37) | 259 (31) |
| | | | |
| Hypertension, no. % | | | |
| • Yes | 681 (47) | 789 (70) | 614 (73) |
| • No | 433 (30) | 202 (18) | 151 (18) |
| • Not known | 331 (23) | 141 (12) | 80 (9) |
| | | | |

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| Diabetes, no. % | | | |
| • Yes | 525 (36) | 579 (51) | 393 (47) |
| • No | 538 (37) | 364 (32) | 324 (38) |
| • Not known | 382 (26) | 189 (17) | 128 (15) |
| | | | |
| Fasting blood glucose, mmol/L | | | |
| • N | 1149 | 812 | 600 |
| • Mean (SD) | 8.7 (4.0) | 8.0 (4.0) | 7.4 (3.7) |
| • Median (min, max) | 7.1 (3.2, 29.8) | 6.6 (3.0, 27.8) | 6.1 (3.1, 29.9) |
| | | | |
| Myocardial infarction history, no. % | | | |
| • Yes | 144 (10) | 216 (19) | 202 (24) |
| • No | 876 (61) | 579 (51) | 392 (46) |
| • Not known | 425 (29) | 337 (30) | 251 (30) |
| | | | |
| Documented CAD > 50% stenosis, no. % | | | |
| • Yes | 74 (5) | 230 (20) | 204 (24) |
| • No | 851 (59) | 527 (47) | 356 (42) |
| • Not known | 520 (36) | 375 (33) | 285 (34) |
| Chronic angina (onset more than 2 weeks ago), no. % | | | |
| • Yes | 103 (7) | 189 (17) | 210 (25) |
| • No | 920 (64) | 651 (58) | 441 (52) |
| • Not known | 422 (29) | 292 (26) | 194 (23) |
| | | | |
| New onset angina (less than 2 weeks), no. % | | | |
| • Yes | 628 (43) | 538 (48) | 366 (43) |
| • No | 479 (33) | 378 (33) | 303 (36) |
| • Not known | 338 (23) | 216 (19) | 176 (21) |
| | | | |
| Heart failure, no. % | | | |
| • Yes | 48 (3) | 153 (14) | 83 (10) |
| • No | 1008 (70) | 724 (64) | 557 (66) |
| • Not known | 389 (27) | 255 (23) | 205 (24) |
| | | | |
| Chronic lung disease, no. % | | | |
| • Yes | 34 (2) | 57 (5) | 39 (5) |
| • No | 1016 (70) | 810 (72) | 605 (72) |
| • Not known | 395 (27) | 265 (23) | 201 (24) |
| | | | |
| Renal disease, no. % | | | |
| • Yes | 58 (4) | 142 (13) | 53 (6) |
| • No | 989 (68) | 729 (64) | 587 (69) |
| • Not known | 398 (28) | 261 (23) | 205 (24) |
| | | | |
| Cerebrovascular disease, no. % | | | |
| • Yes | 46 (3) | 65 (6) | 38 (4) |
| • No | 1011 (70) | 806 (71) | 603 (71) |
| • Not known | 388 (27) | 261 (23) | 204 (24) |
| | | | |

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| Peripheral vascular disease, no. % | | | |
| • Yes | 4 (0) | 25 (2) | 8 (1) |
| • No | 1040 (72) | 830 (73) | 622 (74) |
| • Not known | 401 (28) | 277 (24) | 215 (25) |
| | | | |
| None of the above, no. % | | | |
| • Yes | 125 (9) | 36 (3) | 18 (2) |
| • No | 1320 (91) | 1096 (97) | 827 (98) |
| • Not known | 0 (0) | 0 (0) | 0 (0) |
| Coronary artery disease*, no. % | | | |
| • Yes | 779 (54) | 787 (70) | 633 (75) |
| • No | 306 (21) | 146 (13) | 80 (9) |
| • Not known | 360 (25) | 199 (18) | 132 (16) |

**Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction,, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*

*Note: Percentage is to the nearest decimal point.*

Figure 2.7a Age group (years) distribution for patients with ACS by ACS stratum, Malaysia 2006

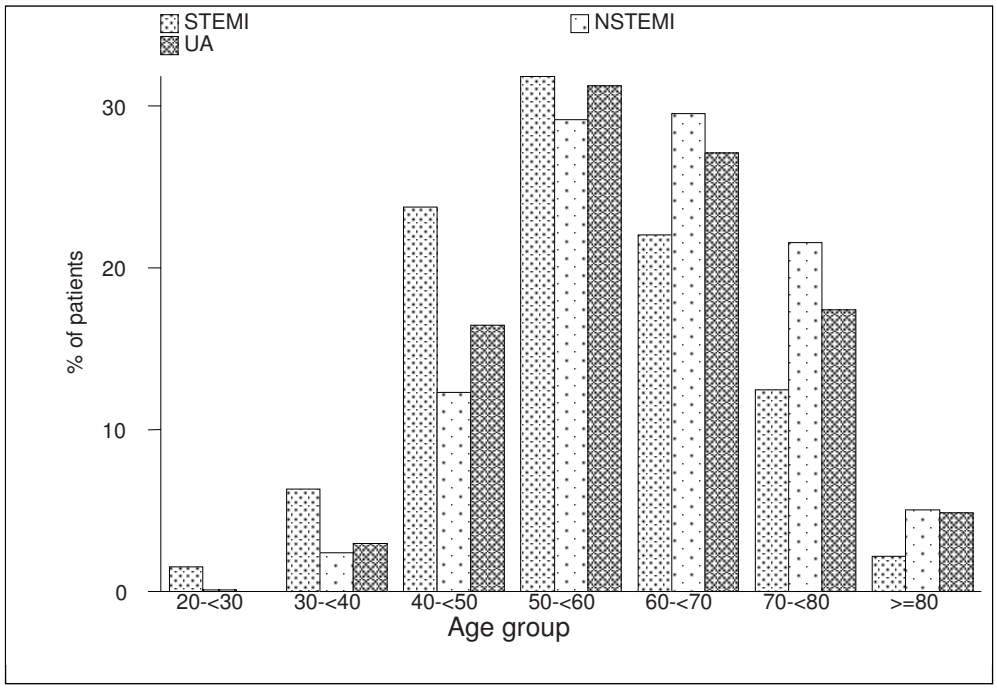



Figure 2.7b Gender distribution for patients with ACS by ACS stratum, Malaysia 2006

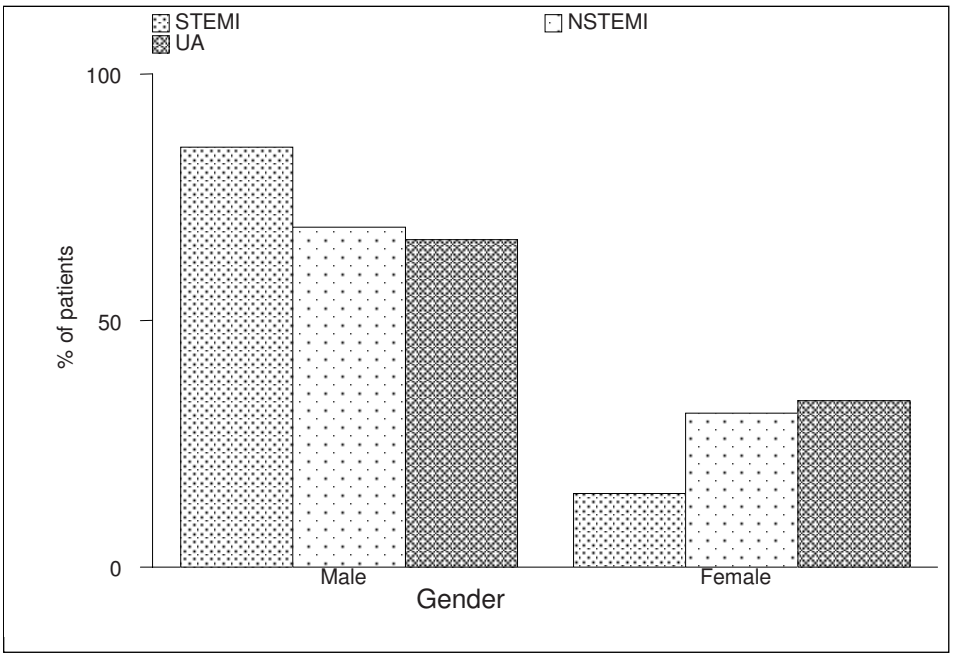


Figure 2.7c Ethnic group distribution for patients with ACS by ACS stratum, Malaysia 2006

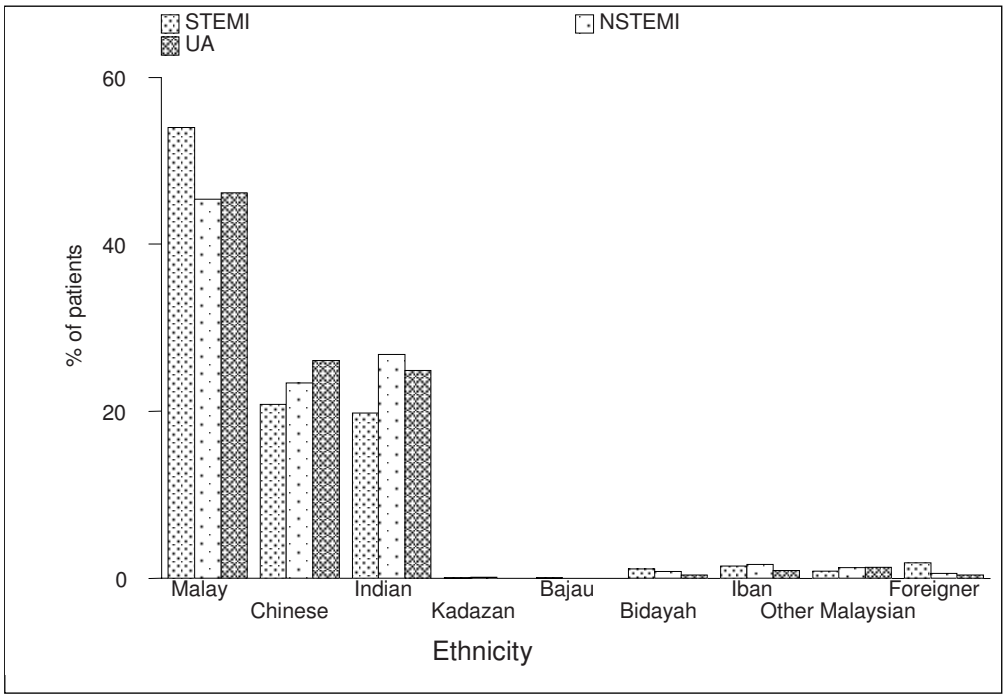



Figure 2.7d Smoking status for patients with ACS by ACS stratum, Malaysia 2006

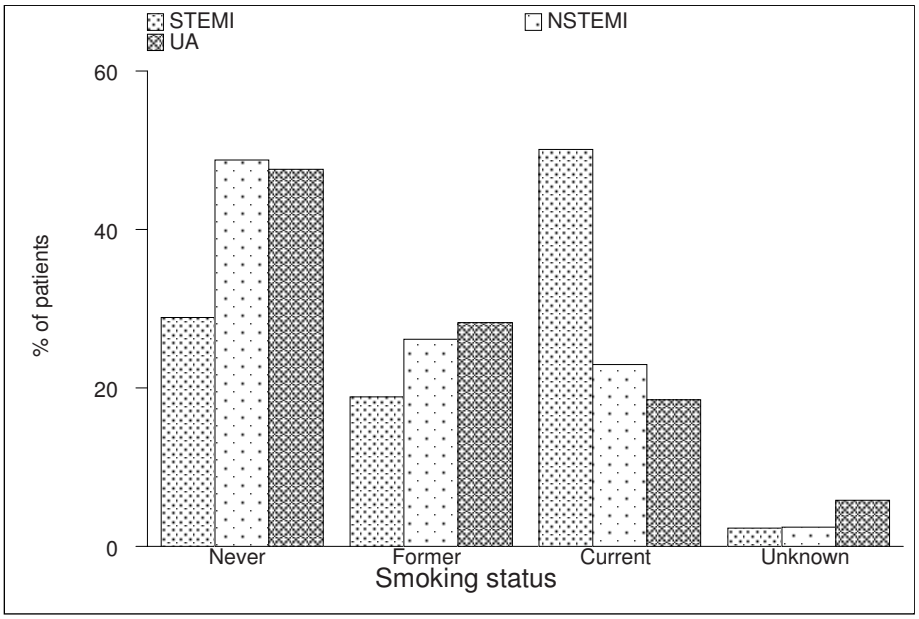


Figure 2.7e Family history of premature cardiovascular disease for patients with ACS by ACS stratum, Malaysia 2006

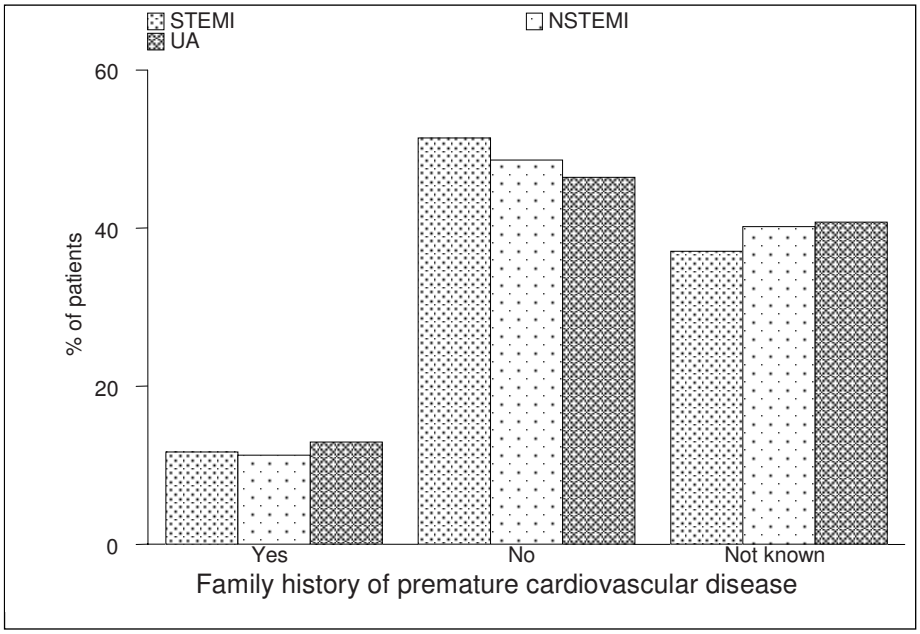



Figure 2.7f BMI for patients with ACS by ACS stratum, Malaysia 2006

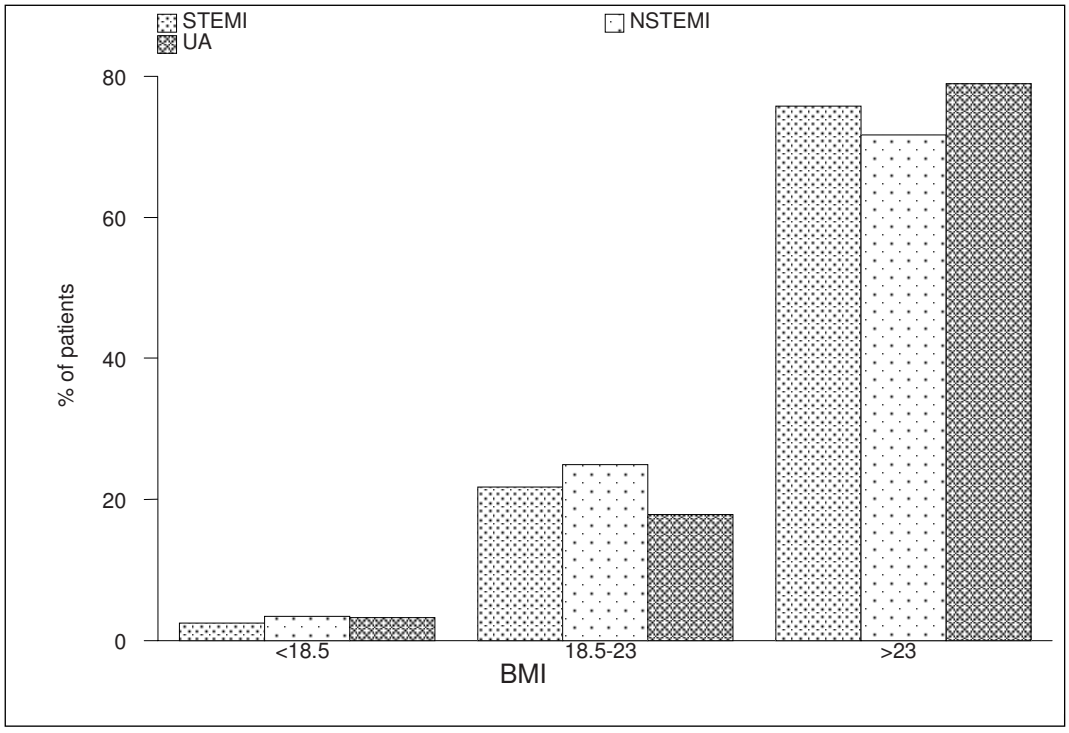


Figure 2.7g WHR for patients with ACS by ACS stratum, Malaysia 2006

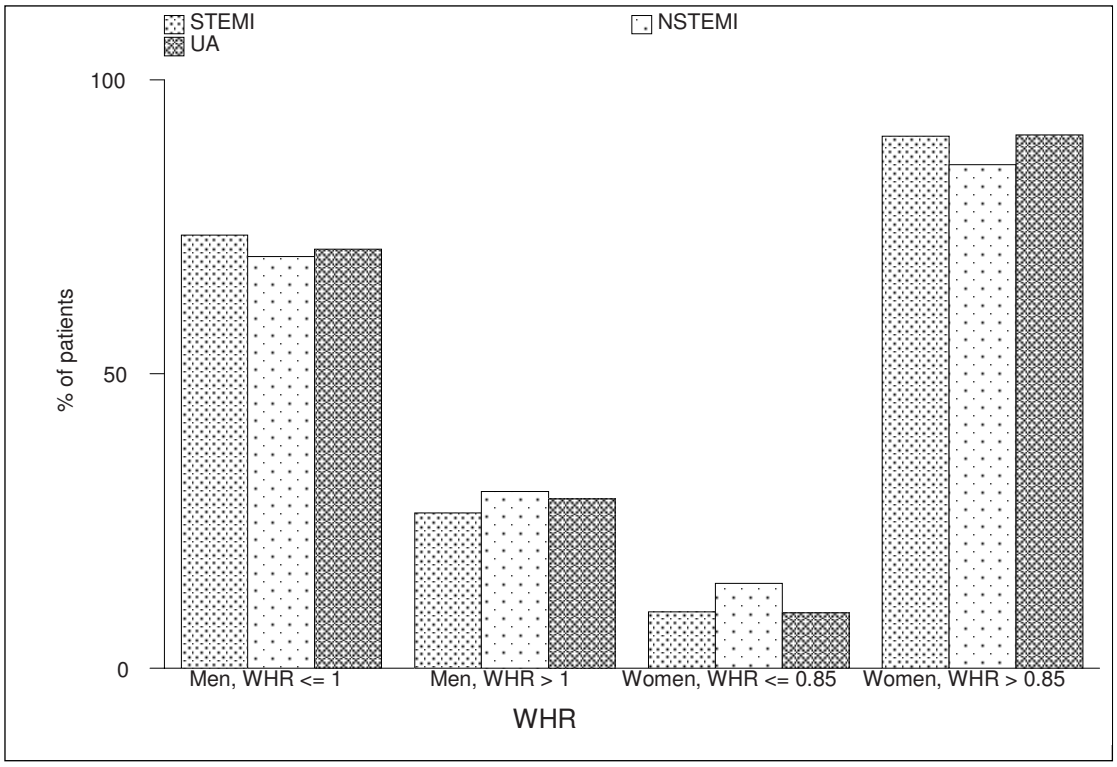



Figure 2.7h Waist circumference (cm) for patients with ACS by ACS stratum, Malaysia 2006

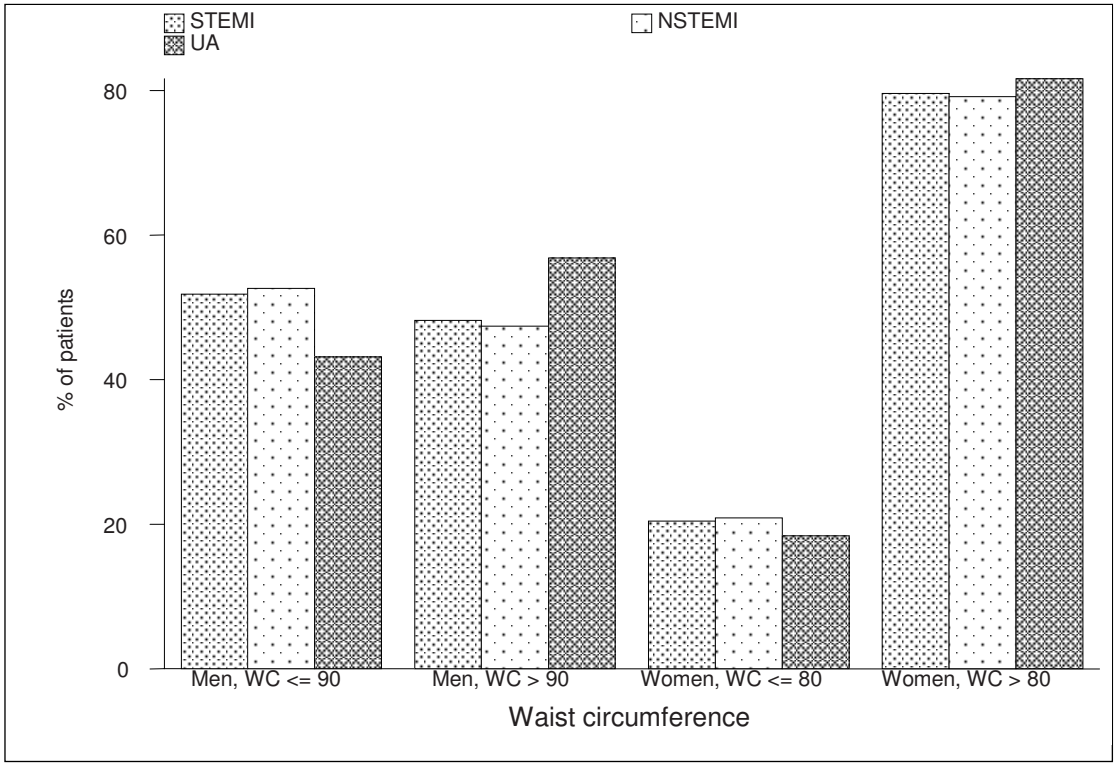
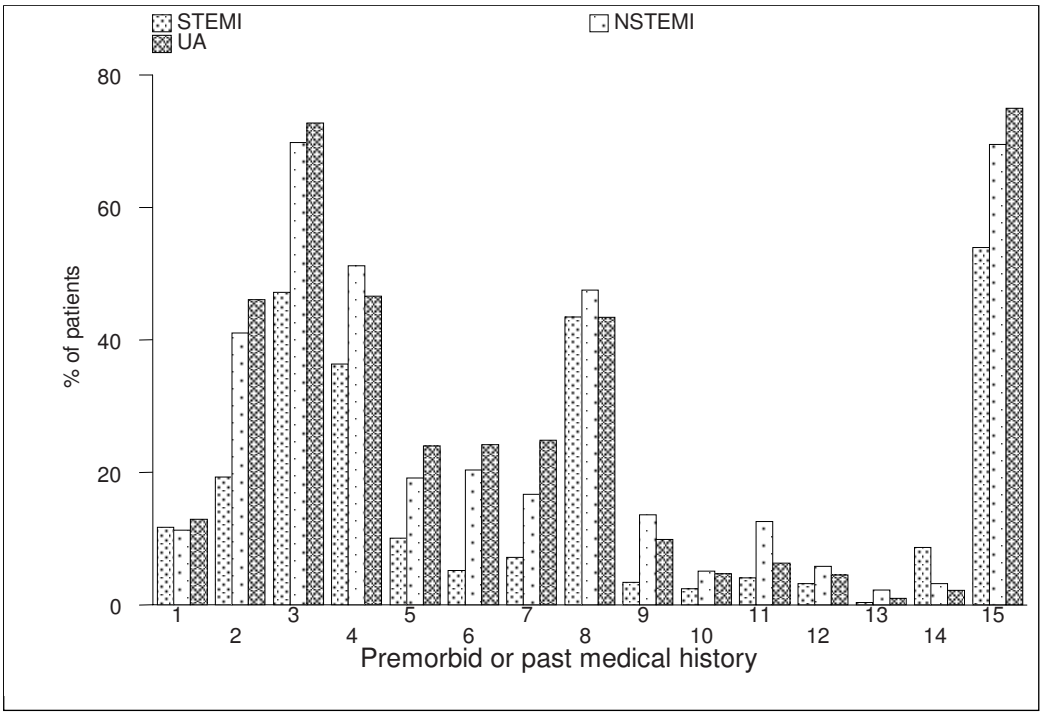


Figure 2.7i Co-morbidities for patients with ACS by ACS stratum, Malaysia 2006




| | **Pre-morbid or past medical history** |
|---|---|
| 1 | Family history of premature cardiovascular disease |
| 2 | Dyslipidaemia |
| 3 | Hypertension |
| 4 | Diabetes |
| 5 | Myocardial infarction history |
| 6 | Documented CAD > 50% stenosis |
| 7 | Chronic angina (onset more than 2 weeks ago) |
| 8 | New onset angina (less than 2 weeks) |
| 9 | Heart failure |
| 10 | Chronic lung disease |
| 11 | Renal disease |
| 12 | Cerebrovascular disease |
| 13 | Peripheral vascular disease |
| 14 | None of the above |
| 15 | Coronary artery disease |

Table 2.7.1 Age-gender distribution of patients with ACS by ACS stratum, Malaysia 2006

| Gender | Age group | ACS stratum | | | | | |
|---|---|---|---|---|---|---|---|
| | | STEMI | | NSTEMI | | UA | |
| | | No. | % | No. | % | No. | % |
| Male | 20 - <30 | 21 | 2 | 1 | 0 | 0 | 0 |
| | 30 - <40 | 87 | 7 | 23 | 3 | 21 | 4 |
| | 40 - <50 | 321 | 26 | 122 | 16 | 98 | 18 |
| | 50 - <60 | 414 | 34 | 274 | 35 | 200 | 36 |
| | 60 - <70 | 256 | 21 | 218 | 28 | 142 | 25 |
| | 70 - <80 | 113 | 9 | 112 | 14 | 81 | 14 |
| | ≥80 | 18 | 1 | 29 | 4 | 18 | 3 |
| | **Total** | **1230** | **100** | **779** | **100** | **560** | **100** |
| Female | 20 - <30 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 30 - <40 | 4 | 2 | 4 | 1 | 4 | 1 |
| | 40 - <50 | 22 | 10 | 17 | 5 | 41 | 14 |
| | 50 - <60 | 46 | 21 | 56 | 16 | 64 | 22 |
| | 60 - <70 | 62 | 29 | 116 | 33 | 87 | 31 |
| | 70 - <80 | 67 | 31 | 132 | 37 | 66 | 23 |
| | ≥80 | 13 | 6 | 28 | 8 | 23 | 8 |
| | **Total** | **215** | **100** | **353** | **100** | **285** | **100** |

*Note: Percentage is to the nearest decimal point.*

Figure 2.7.1a Age-gender distribution for male patients with ACS by ACS stratum, Malaysia 2006

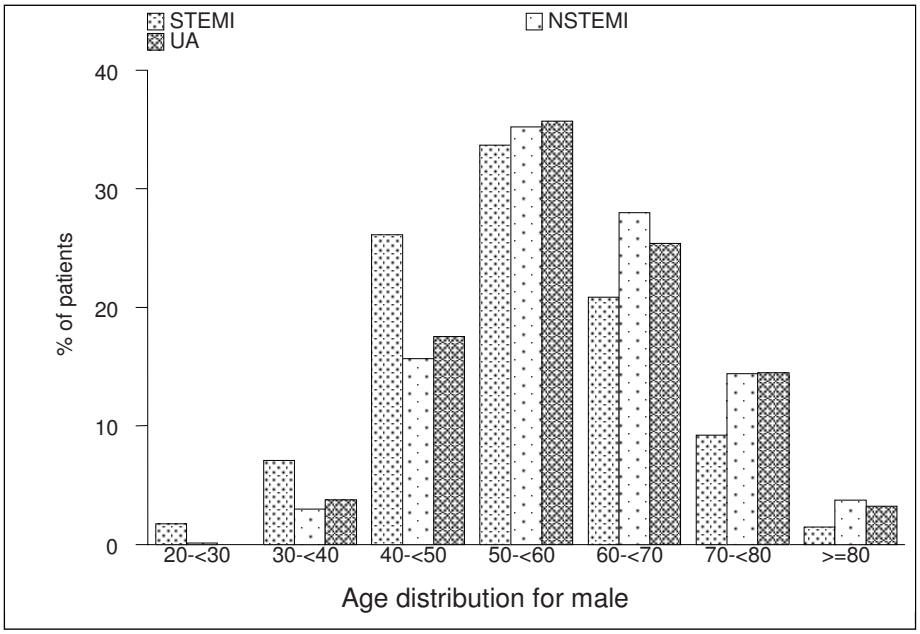
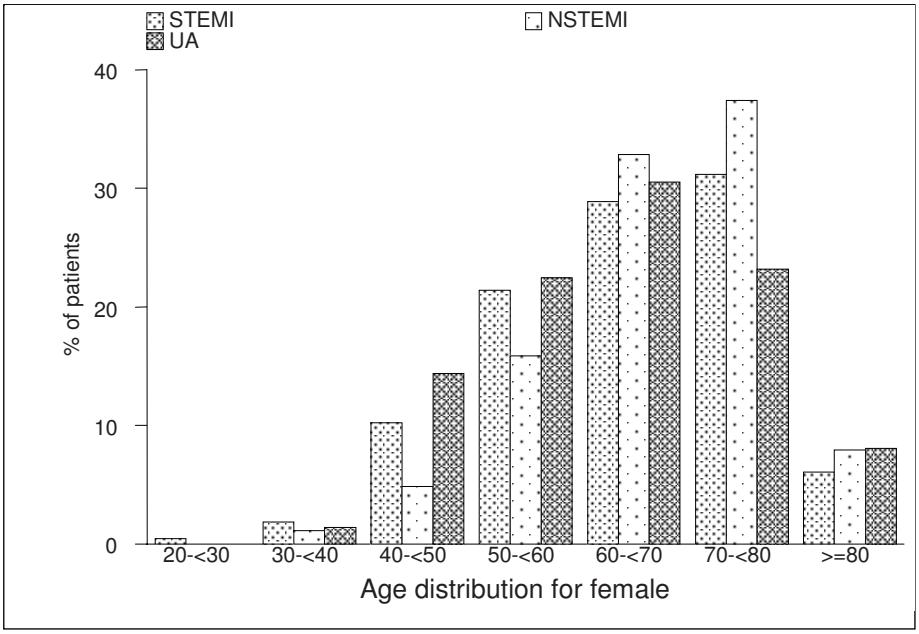


Figure 2.7.1b Age-gender distribution for female patients with ACS by ACS stratum, Malaysia 2006



# CHAPTER 3

# CLINICAL PRESENTATION AND INVESTIGATION

**Saravanan Krishnan**

**Lu Hou Tee**

**Lee Chuey Yan**

This chapter presents the results of clinical presentation and investigations of acute coronary syndrome patients registered in the ACS registry.

As discussed in Chapter 2, patients were classified according to ACS presentations of STEMI, NSTEMI and UA. A higher percentage of patients presented as STEMI (42%), followed by NSTEMI (32%) and UA (25%). The lower percentage of patients presented as NSTEMI and UA in this cohort could be due to underreporting as some of these patients were admitted to the general medical wards or non-cardiac wards.

There is no significant difference in the number of distinct episodes of angina in the past 24 hours among patients with STEMI (70%), NSTEMI (62%) and UA (65%) (Table 3.1).

The Killip classification was used to categorize the presence and severity of heart failure at the time of initial presentation [1]. The results show that 56% of STEMI patients were categorized in Killip class I and were followed by Killip class II (20%); both Killip class III and Killip class IV collectively made up 9%. Killip classification was also used among the NSTEMI and UA patients as it was documented as a powerful independent predictor of all-cause mortality in NSTEMI patients [1]. For NSTEMI and UA patients, both class III and IV made up 10 % and 2% respectively.

The result shows that more than 90% of patients in each category had gone through either one of the following cardiac marker tests, which are Creatine Kinase-MB, Creatine Kinase, Troponin T or Troponin I.

Among STEMI patients, 85% (N=801) of them showed positive results for CK-MB test, 75% (N=1325) for CK; 99% (N=183) and 93% (N=58) for Troponin T and Troponin I, respectively. While among NSTEMI patients, 52% (N=874) showed positive results for CK-MB test, 38% (N=970) for CK; 98% (N=446) and 93% (N=167) for Troponin T and Troponin I, respectively. Troponin testing was conducted on only a small number of patients, as a few hospitals in the NCVD-ACS registry have the test available.

Among the younger patients (aged from 20 to less than 40 years old) who presented with acute coronary syndrome, majority of them presented with STEMI (68%). (Table 3.2.1) The incidence of systolic hypertension among older patients was found to be higher as expected. The result also shows that the peak cardiac biomarkers were higher among the younger patients. The total cholesterol, LDL and triglycerides levels were higher among the younger patients. This is a reflection of the dietary trends among the young. As expected, a higher percentage of older patients presented with Killip class II (21%) and Killip class III and IV (9%) compared to Killip class II (7%) and Killip class III and IV (3%) in the younger age group.

The incidence of STEMI was higher in men (48%) compared to women (25%). However, more women were reported to have NSTEMI (41%) and UA (33%) compared to men, who accounted for 30% and 22% respectively.

The Left Ventricular Ejection Fraction (LV EF) is poorer among the elderly and diabetic patients. These patients were likely to have chronic diffuse ischemic disease. A large proportion of patients do not know their pre-morbid dyslipidemia status. There was a higher incidence of STEMI among patients who do not have diabetes, hypertension and elevated lipid levels. However, this finding is most likely misleading, as a large proportion of patients in this group remained undiagnosed for their co-morbidities.

**Summary Points:**

- Out of the 3422 patients with ACS 42% presented with STEMI, 33% with NSTEMI and 25% UA.
- Most of the patients in STEMI group were in Killip class I and II, 5% of STEMI patients were in Killip class IV compared to 3% in NSTEMI group and none in UA.
- There were no significant differences in baseline blood pressure (BP), heart rate (HR), cholesterol or blood sugar levels between the three groups.
- STEMI patients have a lower number of established risk factors with respect to dyslipidaemia, hypertension and diabetes mellitus compared to NSTEMI and UA patients.

**Reference:**

1 Khot U.N., J. Gang, Moliterno D.J. et.al. 2003. Prognostics Importance of Physical Examination for Heart Failure in Non-ST Elevation Acute Coronary Syndromes: The enduring value of Killip classification. *Journal of the American Medical Association (JAMA).*290: 2174-2181

Table 3.1 Cardiac presentations of patients with ACS by ACS stratum, Malaysia 2006

| | **STEMI N=1445** | **NSTEMI N=1132** | **UA N=845** |
|---|---|---|---|
| Systolic blood pressure, mmHg | | | |
| • N | 1428 | 1116 | 836 |
| • Mean, SD | 134 (28) | 145 (30) | 146 (28) |
| • Median, (min, max) | 130 (60, 230) | 142 (66, 230) | 142 (60, 224) |
| | | | |
| Diastolic blood pressure, mmHg | | | |
| • N | 1402 | 1087 | 823 |
| • Mean, SD | 80 (17) | 82 (17) | 82 (15) |
| • Median, (min, max) | 80 (26, 120) | 82 (19, 120) | 82 (34, 120) |
| | | | |
| Heart rate at presentation, beats/min | | | |
| • N | 1434 | 1122 | 838 |
| • Mean, SD | 82 (21) | 86 (23) | 81 (19) |
| • Median, (min, max) | 80 (30, 180) | 84 (29, 180) | 79 (40, 166) |
| | | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | | |
| • 0-2 | 933 (65) | 626 (55) | 459 (54) |
| • >2 | 68 (5) | 74 (7) | 93 (11) |
| • Missing | 444 (31) | 432 (38) | 293 (35) |
| | | | |
| Killip classification code, no. % | | | |
| • I | 802 (56) | 489 (43) | 377 (45) |
| • II | 288 (20) | 206 (18) | 98 (12) |
| • III | 62 (4) | 76 (7) | 15 (2) |
| • IV | 66 (5) | 30 (3) | 4 (0) |
| • Not stated/inadequately described | 227 (16) | 331 (29) | 351 (42) |
| | | | |
| Patients with any cardiac marker done, no. % | 1402 (97) | 1114 (98) | 762 (90) |
| | | | |
| Peak CK-MB, Unit/L, no. % | 801 | 874 | 397 |
| • >25 | 681 (85) | 457 (52) | 0 (0) |
| | | | |
| Peak CK, Unit/L, no. % | 1325 | 970 | 722 |
| • >2x reference upper limits | 999 (75) | 364 (38) | 0 (0) |
| | | | |
| Peak TnT, no. % | 183 | 446 | 27 |
| • Positive or >0.01 | 181 (99) | 436 (98) | 0 (0) |
| | | | |
| Peak TnI, no. % | 58 | 167 | 55 |
| • Positive or > reference upper limit/0.04 | 54 (93) | 156 (93) | 0 (0) |
| | | | |
| Total cholesterol, mmol/L | | | |
| • N | 1175 | 788 | 508 |
| • Mean, SD | 5.4 (1.3) | 5.2 (1.3) | 5.1 (1.3) |
| • Median, (min, max) | 5.3 (3.0, 14.3) | 5.1 (3.0, 11.0) | 5.0 (3.0, 10.8) |
| | | | |

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| HDL-C, mmol/L | | | |
| • N | 1155 | 807 | 514 |
| • Mean, SD | 1.13 (0.38) | 1.13 (0.37) | 1.12 (0.38) |
| • Median, (min, max) | 1.10 (0.50, 4.94) | 1.10 (0.50, 4.24) | 1.07 (0.50, 4.50) |
| | | | |
| LDL-C, mmol/L | | | |
| • N | 1144 | 793 | 491 |
| • Mean, SD | 3.45 (1.22) | 3.16 (1.20) | 3.09 (1.19) |
| • Median, (min, max) | 3.40 (1.10, 10.10) | 3.03 (1.00, 8.87) | 2.99 (1.00, 8.90) |
| | | | |
| Triglycerides, mmol/L | | | |
| • N | 1025 | 687 | 439 |
| • Mean, SD | 2.05 (1.26) | 2.06 (1.18) | 2.25 (1.54) |
| • Median, (min, max) | 1.70 (1.00, 13.50) | 1.70 (1.00, 11.10) | 1.80 (1.00, 14.00) |
| | | | |
| Left ventricular ejection fraction, % | | | |
| • N | 948 | 569 | 199 |
| • Mean, SD | 47 (11) | 47 (14) | 50 (17) |
| • Median, (min, max) | 47 (10, 79) | 48 (9, 79) | 52 (8, 80) |

*** Not all participating centre performed Troponin T or I tests.*

*Note: Percentage is to the nearest decimal point.*

Figure 3.1.1 Number of distinct angina episodes for patients with ACS by ACS stratum, Malaysia 2006

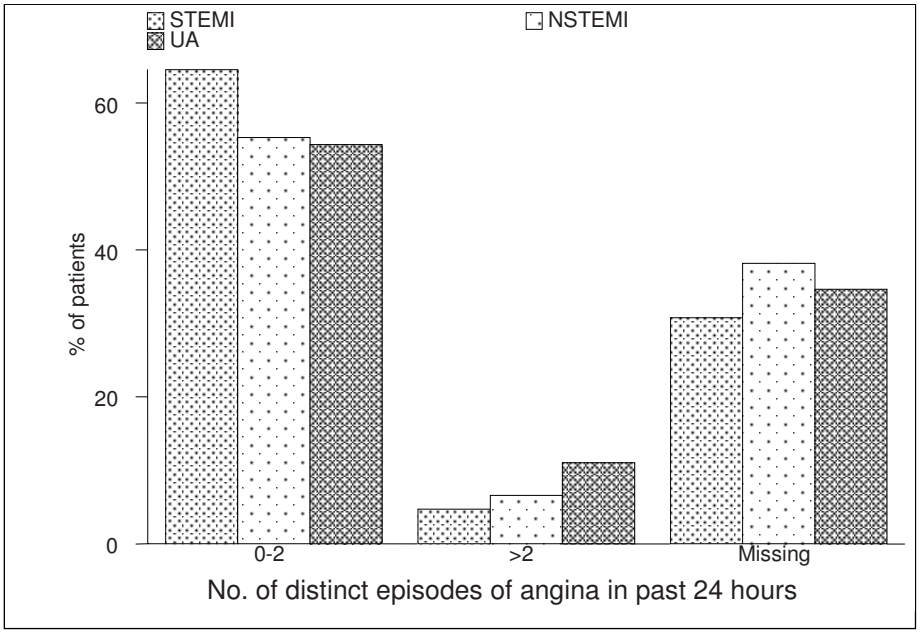



Figure 3.1.2 Killip classification code for patients with ACS by ACS stratum, Malaysia 2006

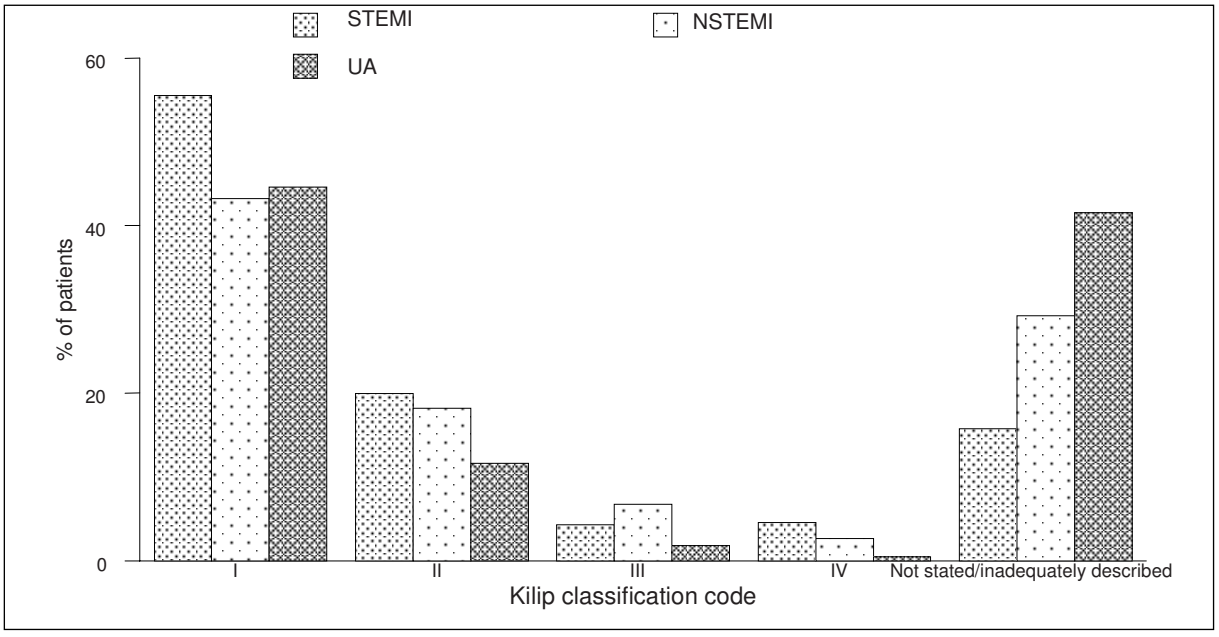


Table 3.2.1 Cardiac presentation of patients with ACS by age group (years), Malaysia 2006

| | Age group* | | |
|---|---|---|---|
| | **Young N=166** | **Middle-age N=1675** | **Elderly N=1581** |
| Acute coronary syndrome stratum, no. % | | | |
| • STEMI | 113 (68) | 803 (48) | 529 (33) |
| • NSTEMI | 28 (17) | 469 (28) | 635 (40) |
| • UA | 25 (15) | 403 (24) | 417 (26) |
| | | | |
| Systolic blood pressure, mmHg | | | |
| • N | 165 | 1657 | 1558 |
| • Mean, SD | 133 (25) | 139 (28) | 143 (31) |
| • Median, (min, max) | 130 (77, 220) | 137 (60, 230) | 140 (60, 230) |
| | | | |
| Diastolic blood pressure, mmHg | | | |
| • N | 158 | 1620 | 1534 |
| • Mean, SD | 81 (17) | 83 (16) | 80 (17) |
| • Median, (min, max) | 80 (38, 118) | 82 (35, 120) | 80 (19, 120) |
| | | | |
| Heart rate at presentation, beats/min | | | |
| • N | 165 | 1663 | 1566 |
| • Mean, SD | 83 (19) | 82 (20) | 84 (23) |
| • Median, (min, max) | 82 (44, 153) | 80 (30, 171) | 82 (29, 180) |
| | | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | | |
| • 0-2 | 116 (70) | 1021 (61) | 881 (56) |
| • >2 | 9 (5) | 118 (7) | 108 (7) |
| • Missing | 41 (25) | 536 (32) | 592 (37) |
| | | | |
| Killip classification code, no. % | | | |
| • I | 121 (73) | 900 (54) | 647 (41) |
| • II | 11 (7) | 249 (15) | 332 (21) |
| • III | 2 (1) | 59 (4) | 92 (6) |
| • IV | 4 (2) | 47 (3) | 49 (3) |
| • Not stated/inadequately described | 28 (17) | 420 (25) | 461 (29) |
| | | | |
| Peak CK-MB, Unit/L, no. % | 101 | 994 | 977 |
| • >25 | 70 (69) | 563 (57) | 505 (52) |
| Peak CK, Unit/L, no. % | 144 | 1511 | 1362 |
| • >2x reference upper limits | 95 (66) | 742 (49) | 526 (39) |
| | | | |
| Peak TnT, no. % | 23 | 307 | 326 |
| • Positive or >0.01 | 22 (96) | 285 (93) | 310 (95) |
| Peak TnI, no. % | 17 | 112 | 151 |
| • Positive or > reference upper limit/0.04 | 13 (76) | 77 (69) | 120 (79) |
| | | | |

| | Age group* | | |
|---|---|---|---|
| | **Young N=166** | **Middle-age N=1675** | **Elderly N=1581** |
| Total cholesterol, mmol/L | | | |
| • N | 143 | 1257 | 1071 |
| • Mean, SD | 5.7 (1.7) | 5.5 (1.3) | 5.0 (1.2) |
| • Median, (min, max) | 5.4 (3.1, 14.3) | 5.4 (3.0, 10.8) | 4.9 (3.0, 11.0) |
| | | | |
| HDL-C, mmol/L | | | |
| • N | 141 | 1268 | 1067 |
| • Mean, SD | 1.08 (0.40) | 1.08 (0.35) | 1.19 (0.40) |
| • Median, (min, max) | 1.00 (0.60, 3.50) | 1.01 (0.50, 4.94) | 1.13 (0.50, 4.50) |
| | | | |
| LDL-C, mmol/L | | | |
| • N | 141 | 1218 | 1069 |
| • Mean, SD | 3.67 (1.50) | 3.41 (1.22) | 3.08 (1.14) |
| • Median, (min, max) | 3.46 (1.50, 10.10) | 3.40 (1.00, 9.30) | 3.00 (1.00, 8.87) |
| | | | |
| Triglycerides, mmol/L | | | |
| • N | 132 | 1154 | 865 |
| • Mean, SD | 2.39 (1.47) | 2.24 (1.36) | 1.85 (1.14) |
| • Median, (min, max) | 2.10 (1.00, 13.50) | 1.90 (1.00, 13.00) | 1.56 (1.00, 14.00) |
| | | | |
| Left ventricular ejection fraction, % | | | |
| • N | 96 | 863 | 757 |
| • Mean, SD | 51 (12) | 48 (13) | 46 (13) |
| • Median, (min, max) | 50 (12, 75) | 50 (8, 80) | 45 (10, 80) |

**Young is defined as age from 20 to less than 40 years, middle-age is defined as age between 40 to less than 60 years and elderly is defined as 60 years and above*

*Note: Percentage is to the nearest decimal point.*

Figure 3.2.1a Stratum distribution for patients with ACS by age group (years), Malaysia 2006

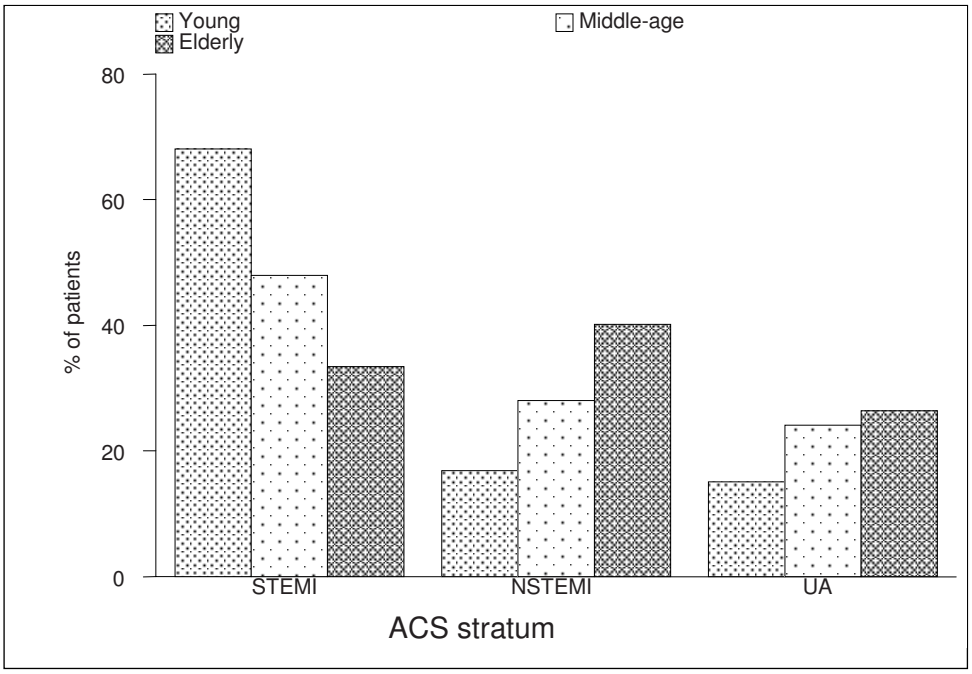



Figure 3.2.1b Number of distinct angina episodes for patients with ACS by age group (years), Malaysia 2006

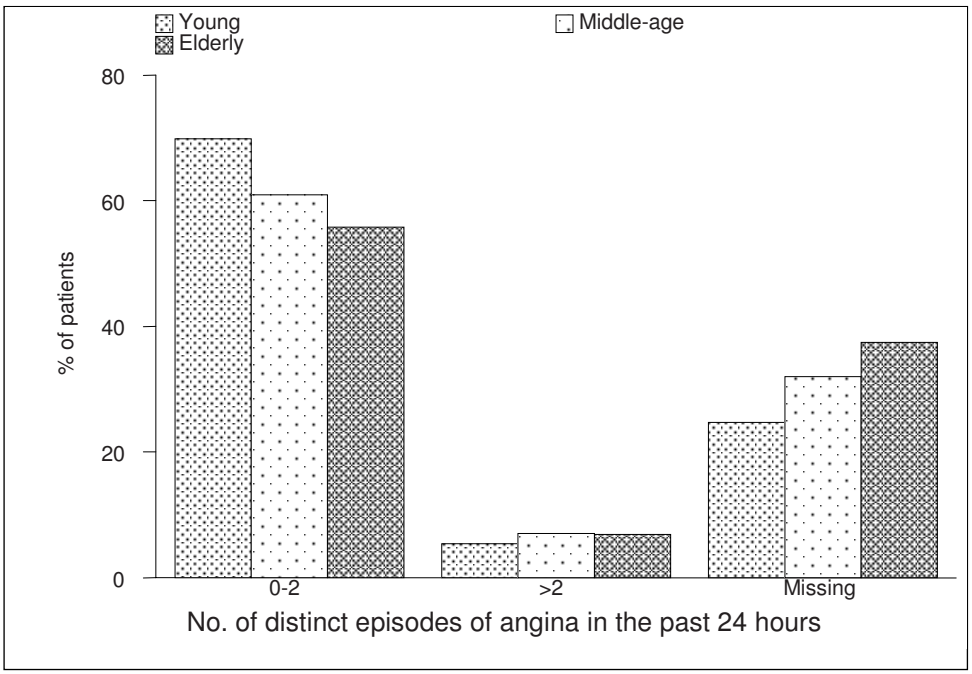


Figure 3.2.1c Killip classification code for patients with ACS by age group (years), Malaysia 2006

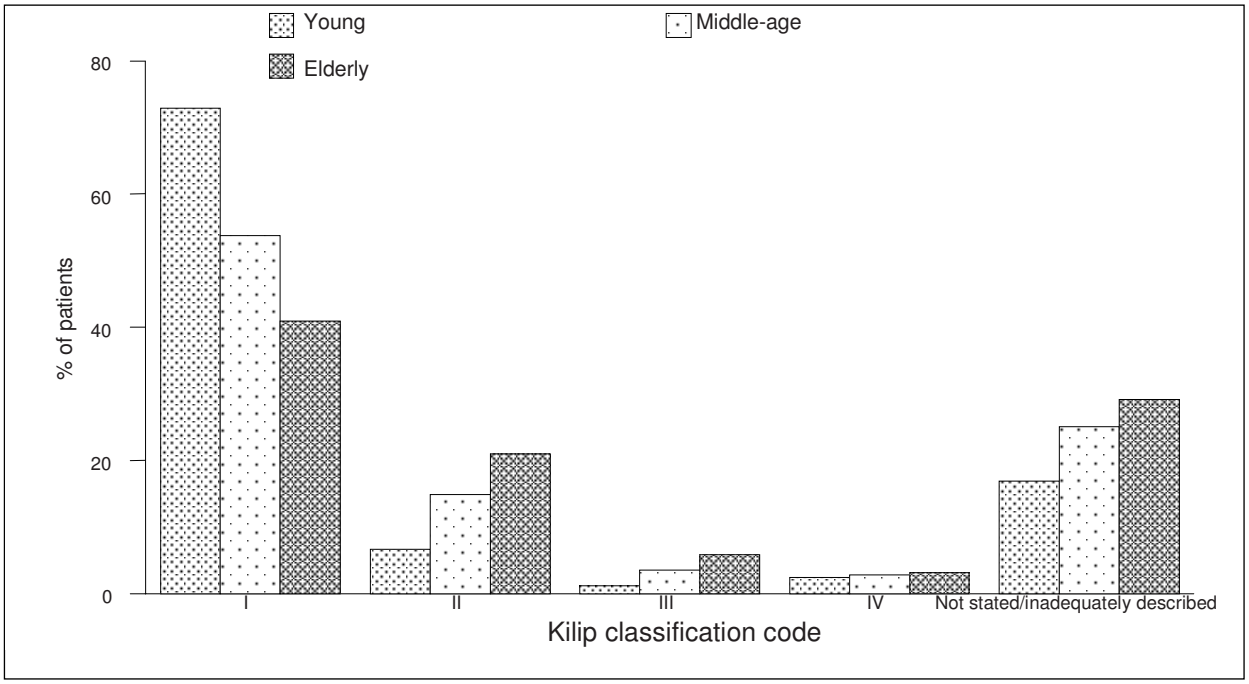


Table 3.2.2 Cardiac presentation of patients with ACS by gender, Malaysia 2006

| | **Male N=2569** | **Female N=853** |
|---|---|---|
| Acute coronary syndrome stratum, no. % | | |
| • STEMI | 1230 (48) | 215 (25) |
| • NSTEMI | 779 (30) | 353 (41) |
| • UA | 560 (22) | 285 (33) |
| | | |
| Systolic blood pressure, mmHg | | |
| • N | 2542 | 838 |
| • Mean, SD | 138 (28) | 147 (31) |
| • Median, (min, max) | 136 (60, 230) | 144 (60, 229) |
| | | |
| Diastolic blood pressure, mmHg | | |
| • N | 2484 | 828 |
| • Mean, SD | 82 (17) | 80 (17) |
| • Median, (min, max) | 80 (30, 120) | 80 (19, 120) |
| | | |
| Heart rate at presentation, beats/min | | |
| • N | 2548 | 846 |
| • Mean, SD | 82 (21) | 88 (22) |
| • Median, (min, max) | 80 (30, 180) | 86 (29, 166) |
| | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | |
| • 0-2 | 1564 (61) | 454 (53) |
| • >2 | 176 (7) | 59 (7) |
| • Missing | 829 (32) | 340 (40) |
| | | |
| Killip classification code, no. % | | |
| • I | 1319 (51) | 349 (41) |
| • II | 429 (17) | 163 (19) |
| • III | 107 (4) | 46 (5) |
| • IV | 79 (3) | 21 (2) |
| • Not stated/inadequately described | 635 (25) | 274 (32) |
| | | |
| Peak CK-MB, Unit/L, no. % | 1541 | 531 |
| • >25 | 908 (59) | 230 (43) |
| | | |
| Peak CK, Unit/L, no. % | 2311 | 706 |
| • >2x reference upper limits | 1147 (50) | 216 (31) |
| | | |
| Peak TnT, no. % | 491 | 165 |
| • Positive or >0.01 | 464 (95) | 153 (93) |
| | | |
| Peak TnI, no. % | 180 | 100 |
| • Positive or > reference upper limit/0.04 | 134 (74) | 76 (76) |
| | | |

| | Male N=2569 | Female N=853 |
|---|---|---|
| Total cholesterol, mmol/L | | |
| • N | 1907 | 564 |
| • Mean, SD | 5.3 (1.3) | 5.3 (1.4) |
| • Median, (min, max) | 5.1 (3.0, 14.3) | 5.2 (3.0, 11.0) |
| | | |
| HDL-C, mmol/L | | |
| • N | 1904 | 572 |
| • Mean, SD | 1.10 (0.37) | 1.22 (0.40) |
| • Median, (min, max) | 1.06 (0.50, 4.94) | 1.20 (0.50, 4.24) |
| | | |
| LDL-C, mmol/L | | |
| • N | 1857 | 571 |
| • Mean, SD | 3.30 (1.20) | 3.21 (1.28) |
| • Median, (min, max) | 3.24 (1.00, 10.10) | 3.04 (1.00, 8.90) |
| | | |
| Triglycerides, mmol/L | | |
| • N | 1661 | 490 |
| • Mean, SD | 2.12 (1.31) | 1.99 (1.24) |
| • Median, (min, max) | 1.75 (1.00, 13.50) | 1.61 (1.00, 14.00) |
| | | |
| Left ventricular ejection fraction, % | | |
| • N | 1338 | 378 |
| • Mean, SD | 47 (13) | 49 (14) |
| • Median, (min, max) | 47 (8, 79) | 50 (15, 80) |

*Note: Percentage is to the nearest decimal point.*

Figure 3.2.2a Stratum distribution for patients with ACS by gender, Malaysia 2006

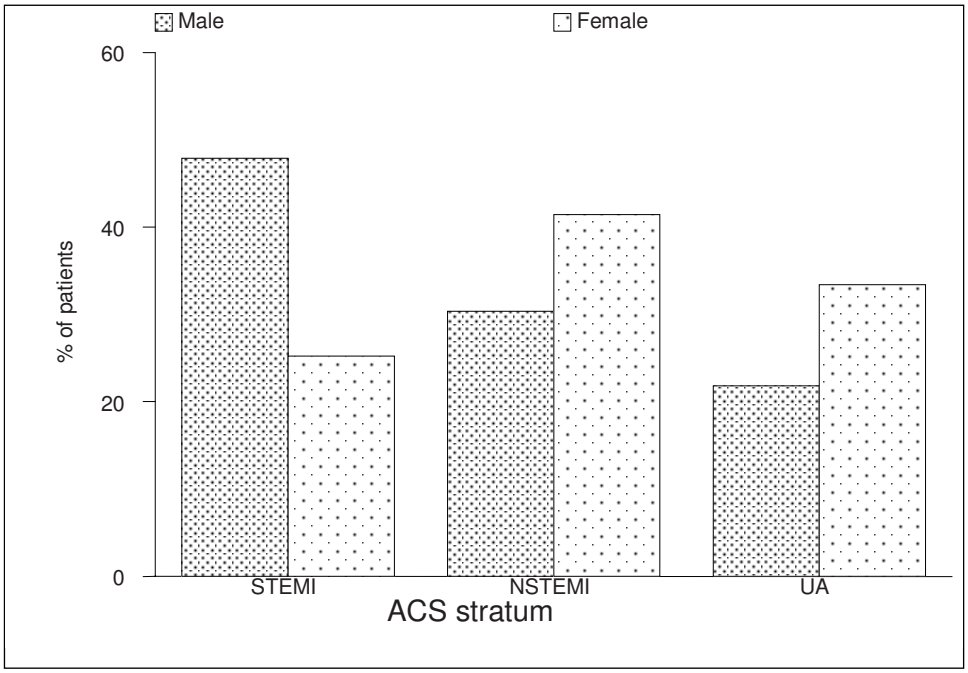


Figure 3.2.2b Number of distinct angina episodes for patients with ACS by gender, Malaysia 2006

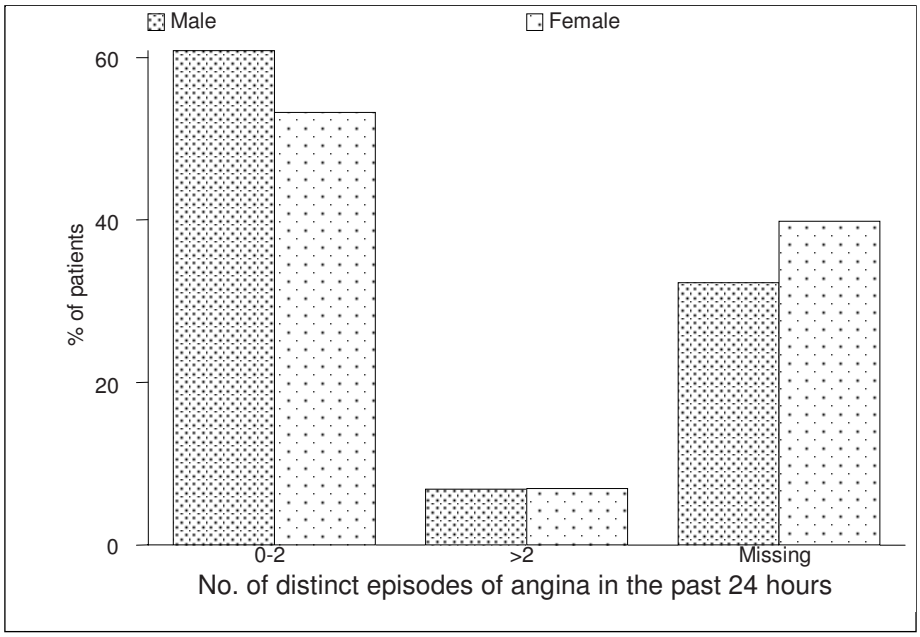



Figure 3.2.2c Killip classification code for patients with ACS by gender, Malaysia 2006

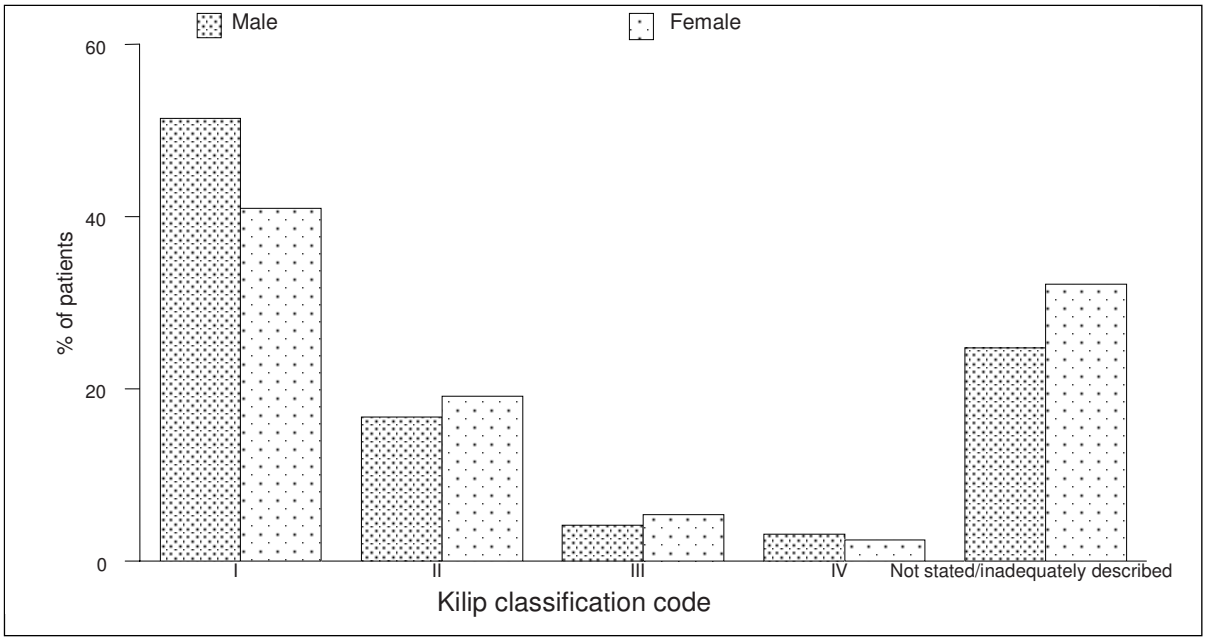


Table 3.2.3 Cardiac presentation of patients with ACS by pre-morbid diabetes, Malaysia 2006

| | Pre-morbid diabetes | | |
|---|---|---|---|
| | **Diabetic N=1497** | **Non-diabetic N=1226** | **Not known N=699** |
| Acute coronary syndrome stratum, no. % | | | |
| • STEMI | 525 (35) | 538 (44) | 382 (55) |
| • NSTEMI | 579 (39) | 364 (30) | 189 (27) |
| • UA | 393 (26) | 324 (26) | 128 (18) |
| | | | |
| Systolic blood pressure, mmHg | | | |
| • N | 1475 | 1215 | 690 |
| • Mean, SD | 142 (30) | 140 (29) | 136 (28) |
| • Median, (min, max) | 140 (66, 229) | 137 (60, 230) | 134 (64, 219) |
| | | | |
| Diastolic blood pressure, mmHg | | | |
| • N | 1457 | 1180 | 675 |
| • Mean, SD | 81 (16) | 81 (17) | 81 (17) |
| • Median, (min, max) | 80 (19, 120) | 81 (26, 120) | 80 (30, 120) |
| | | | |
| Heart rate at presentation, beats/min | | | |
| • N | 1486 | 1216 | 692 |
| • Mean, SD | 86 (21) | 80 (21) | 81 (22) |
| • Median, (min, max) | 85 (29, 180) | 78 (35, 171) | 79 (39, 171) |
| | | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | | |
| • 0-2 | 862 (58) | 669 (55) | 487 (70) |
| • >2 | 109 (7) | 69 (6) | 57 (8) |
| • Missing | 526 (35) | 488 (40) | 155 (22) |
| | | | |
| Killip classification code, no. % | | | |
| • I | 700 (47) | 619 (50) | 349 (50) |
| • II | 290 (19) | 193 (16) | 109 (16) |
| • III | 84 (6) | 39 (3) | 30 (4) |
| • IV | 51 (3) | 22 (2) | 27 (4) |
| • Not stated/inadequately described | 372 (25) | 353 (29) | 184 (26) |
| | | | |
| Peak CK-MB, Unit/L, no. % | 966 | 740 | 366 |
| • >25 | 469 (49) | 421 (57) | 248 (68) |
| | | | |
| Peak CK, Unit/L, no. % | 1354 | 1035 | 628 |
| • >2x reference upper limits | 526 (39) | 489 (47) | 348 (55) |
| | | | |
| Peak TnT, no. % | 333 | 207 | 116 |
| • Positive or >0.01 | 312 (94) | 193 (93) | 112 (97) |
| Peak TnI, no. % | 130 | 92 | 58 |
| • Positive or > reference upper limit/0.04 | 104 (80) | 67 (73) | 39 (67) |
| | | | |

| | Pre-morbid diabetes | | |
|---|---|---|---|
| | **Diabetic N=1497** | **Non-diabetic N=1226** | **Not known N=699** |
| Total cholesterol, mmol/L | | | |
| • N | 1067 | 884 | 520 |
| • Mean, SD | 5.2 (1.3) | 5.3 (1.3) | 5.4 (1.3) |
| • Median, (min, max) | 5.0 (3.0, 10.8) | 5.3 (3.0, 14.3) | 5.3 (3.0, 10.4) |
| | | | |
| HDL-C, mmol/L | | | |
| • N | 1076 | 886 | 514 |
| • Mean, SD | 1.10 (0.39) | 1.16 (0.39) | 1.14 (0.34) |
| • Median, (min, max) | 1.04 (0.50, 4.90) | 1.10 (0.50, 4.94) | 1.10 (0.50, 4.20) |
| | | | |
| LDL-C, mmol/L | | | |
| • N | 1039 | 880 | 509 |
| • Mean, SD | 3.10 (1.22) | 3.37 (1.21) | 3.48 (1.18) |
| • Median, (min, max) | 2.95 (1.00, 9.30) | 3.31 (1.00, 10.10) | 3.37 (1.02, 8.20) |
| | | | |
| Triglycerides, mmol/L | | | |
| • N | 952 | 745 | 454 |
| • Mean, SD | 2.25 (1.44) | 1.96 (1.11) | 1.98 (1.23) |
| • Median, (min, max) | 1.82 (1.00, 14.00) | 1.67 (1.00, 12.90) | 1.62 (1.00, 13.00) |
| | | | |
| Left ventricular ejection fraction, % | | | |
| • N | 736 | 609 | 371 |
| • Mean, SD | 46 (13) | 49 (13) | 48 (13) |
| • Median, (min, max) | 45 (8, 80) | 50 (10, 80) | 49 (10, 78) |

*Note: Percentage is to the nearest decimal point.*

Figure 3.2.3a Stratum distribution for patients with ACS by pre-morbid diabetes, Malaysia 2006

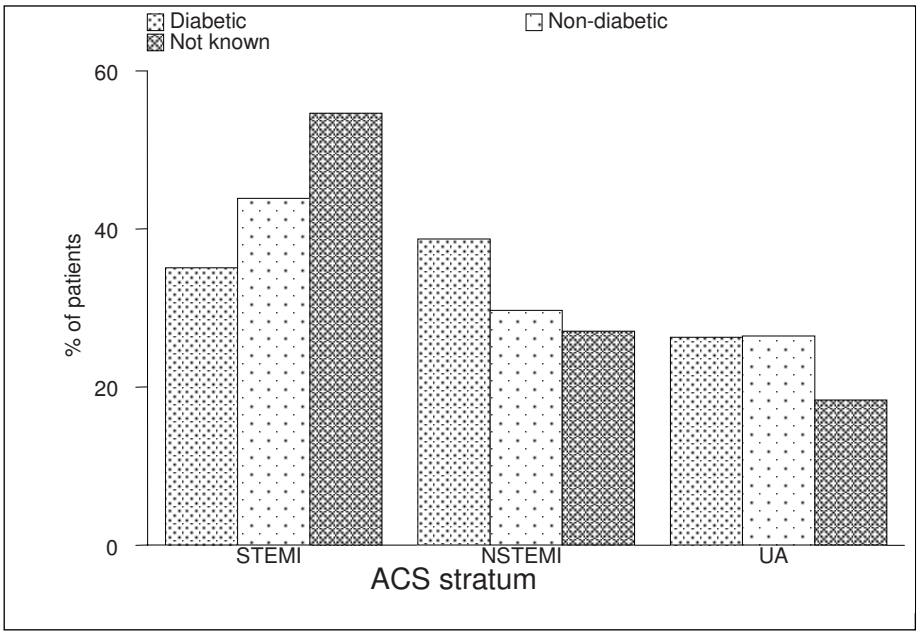



Figure 3.2.3b Number of distinct angina episodes for patients with ACS by pre-morbid diabetes, Malaysia 2006

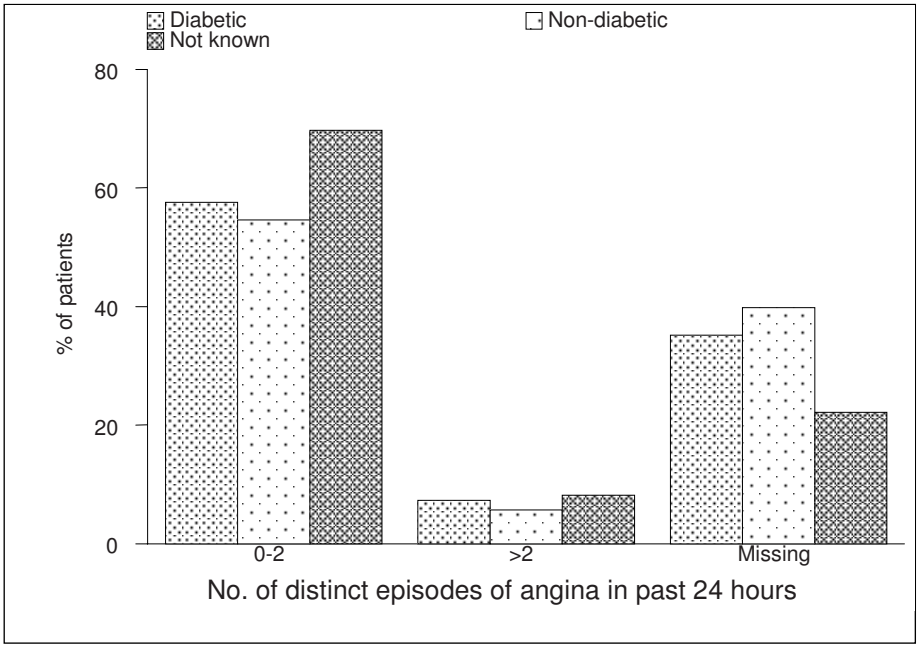


Figure 3.2.3c Killip classification code for patients with ACS by pre-morbid diabetes, Malaysia 2006

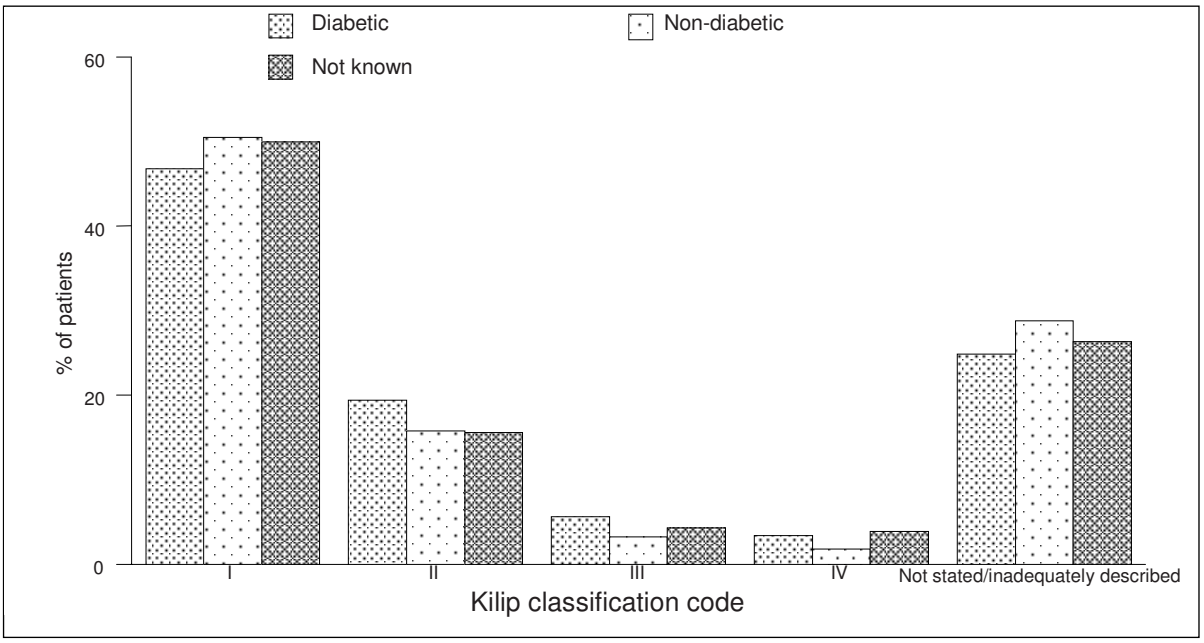


Table 3.2.4 Cardiac presentation of patients with ACS by pre-morbid hypertension, Malaysia 2006

| | **Pre-morbid hypertension** | | |
|---|---|---|---|
| | **Hypertensive N=2084** | **Non-hypertensive N=786** | **Not known N=552** |
| Acute coronary syndrome stratum, no. % | | | |
| • STEMI | 681 (33) | 433 (55) | 331 (60) |
| • NSTEMI | 789 (38) | 202 (26) | 141 (26) |
| • UA | 614 (29) | 151 (19) | 80 (14) |
| | | | |
| Systolic blood pressure, mmHg | | | |
| • N | 2052 | 784 | 544 |
| • Mean, SD | 146 (30) | 132 (26) | 131 (26) |
| • Median, (min, max) | 144 (60, 230) | 130 (60, 226) | 130 (64, 223) |
| | | | |
| Diastolic blood pressure, mmHg | | | |
| • N | 1999 | 773 | 540 |
| • Mean, SD | 83 (17) | 78 (16) | 79 (17) |
| • Median, (min, max) | 83 (26, 120) | 79 (19, 120) | 80 (30, 119) |
| | | | |
| Heart rate at presentation, beats/min | | | |
| • N | 2069 | 779 | 546 |
| • Mean, SD | 84 (22) | 82 (20) | 82 (22) |
| • Median, (min, max) | 82 (29, 180) | 80 (36, 157) | 80 (39, 171) |
| | | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | | |
| • 0-2 | 1206 (58) | 427 (54) | 385 (70) |
| • >2 | 165 (8) | 36 (5) | 34 (6) |
| • Missing | 713 (34) | 323 (41) | 133 (24) |
| | | | |
| Killip classification code, no. % | | | |
| • I | 992 (48) | 411 (52) | 265 (48) |
| • II | 374 (18) | 121 (15) | 97 (18) |
| • III | 94 (5) | 33 (4) | 26 (5) |
| • IV | 45 (2) | 24 (3) | 31 (6) |
| • Not stated/inadequately described | 579 (28) | 197 (25) | 133 (24) |
| | | | |
| Peak CK-MB, Unit/L, no. % | 1314 | 455 | 303 |
| • >25 | 633 (48) | 287 (63) | 218 (72) |
| | | | |
| Peak CK, Unit/L, no. % | 1845 | 682 | 490 |
| • >2x reference upper limits | 680 (37) | 387 (57) | 296 (60) |
| | | | |
| Peak TnT, no. % | 429 | 134 | 93 |
| • Positive or >0.01 | 400 (93) | 128 (96) | 89 (96) |

| | Pre-morbid hypertension | | |
|---|---|---|---|
| | **Hypertensive N=2084** | **Non-hypertensive N=786** | **Not known N=552** |
| Peak TnI, no. % | 189 | 43 | 48 |
| • Positive or > reference upper limit/0.04 | 134 (71) | 37 (86) | 39 (81) |
| | | | |
| Total cholesterol, mmol/L | | | |
| • N | 1462 | 599 | 410 |
| • Mean, SD | 5.2 (1.3) | 5.4 (1.3) | 5.4 (1.4) |
| • Median, (min, max) | 5.1 (3.0, 11.9) | 5.4 (3.0, 14.3) | 5.3 (3.0, 10.4) |
| | | | |
| HDL-C, mmol/L | | | |
| • N | 1481 | 591 | 404 |
| • Mean, SD | 1.13 (0.40) | 1.11 (0.35) | 1.13 (0.34) |
| • Median, (min, max) | 1.10 (0.50, 4.94) | 1.07 (0.50, 3.50) | 1.10 (0.53, 4.20) |
| | | | |
| LDL-C, mmol/L | | | |
| • N | 1442 | 587 | 399 |
| • Mean, SD | 3.15 (1.18) | 3.48 (1.24) | 3.45 (1.26) |
| • Median, (min, max) | 3.04 (1.00, 8.90) | 3.50 (1.10, 10.10) | 3.36 (1.02, 8.20) |
| | | | |
| Triglycerides, mmol/L | | | |
| • N | 1275 | 518 | 358 |
| • Mean, SD | 2.12 (1.34) | 2.06 (1.19) | 2.05 (1.28) |
| • Median, (min, max) | 1.71 (1.00, 14.00) | 1.70 (1.00, 12.90) | 1.67 (1.00, 13.50) |
| | | | |
| Left ventricular ejection fraction, % | | | |
| • N | 980 | 441 | 295 |
| • Mean, SD | 48 (14) | 48 (12) | 46 (13) |
| • Median, (min, max) | 48 (8, 80) | 47 (20, 77) | 46 (10, 79) |

*Note: Percentage is to the nearest decimal point.*

Figure 3.2.4a Stratum distribution for patients with ACS by pre-morbid hypertension, Malaysia 2006

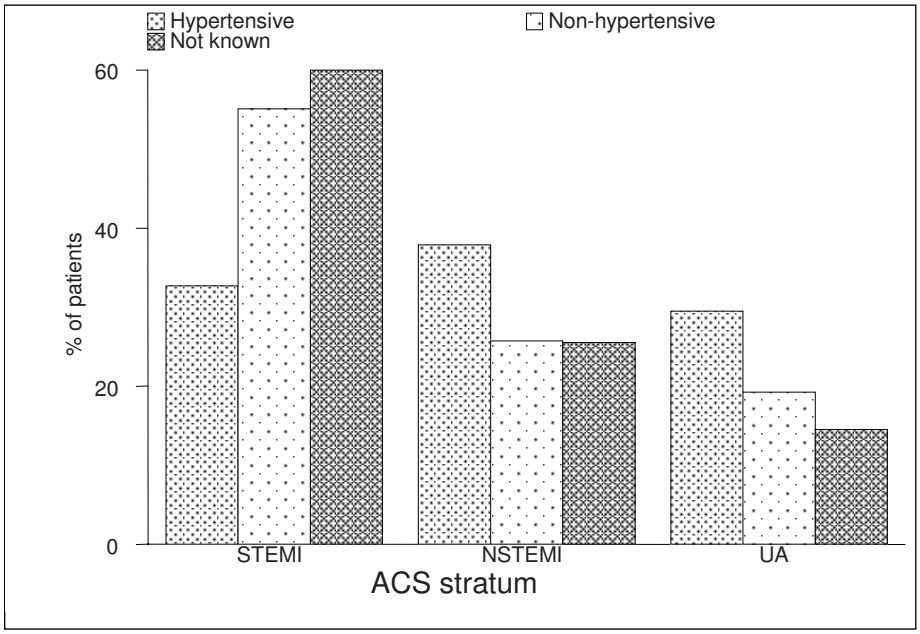



Figure 3.2.4b Number of distinct angina episodes for patients with ACS by pre-morbid hypertension, Malaysia 2006

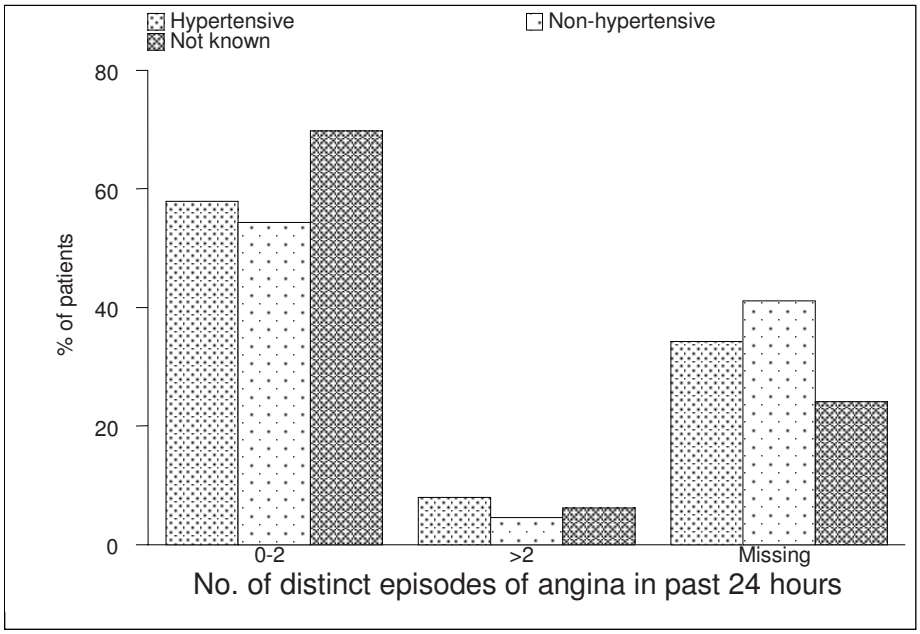


Figure 3.2.4c Killip classification code for patients with ACS by pre-morbid hypertension, Malaysia 2006

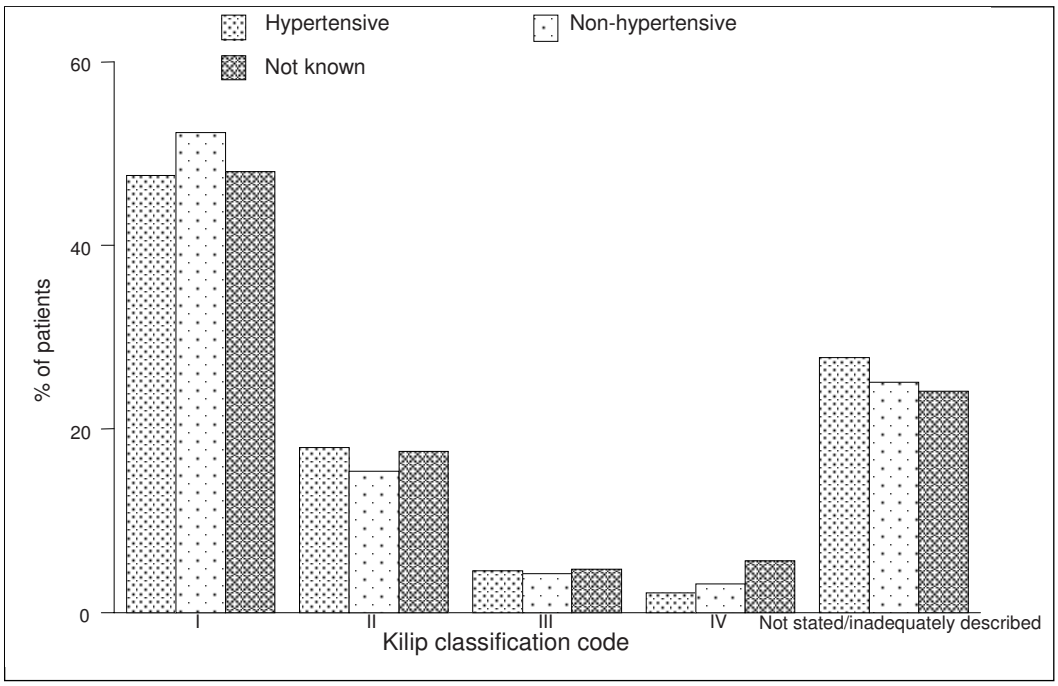


Table 3.2.5 Cardiac presentation of patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

| | **Pre-morbid dyslipidaemia** | | |
|---|---|---|---|
| | **Yes N=1131** | **No N=902** | **Not known N=1389** |
| Acute coronary syndrome stratum, no. % | | | |
| • STEMI | 278 (25) | 458 (51) | 709 (51) |
| • NSTEMI | 464 (41) | 247 (27) | 421 (30) |
| • UA | 389 (34) | 197 (22) | 259 (19) |
| | | | |
| Systolic blood pressure, mmHg | | | |
| • N | 1123 | 891 | 1366 |
| • Mean, SD | 144 (29) | 140 (28) | 138 (30) |
| • Median, (min, max) | 140 (70, 229) | 138 (60, 230) | 135 (60, 230) |
| | | | |
| Diastolic blood pressure, mmHg | | | |
| • N | 1095 | 876 | 1341 |
| • Mean, SD | 82 (16) | 81 (16) | 81 (17) |
| • Median, (min, max) | 81 (19, 120) | 80 (30, 120) | 80 (28, 120) |
| | | | |
| Heart rate at presentation, beats/min | | | |
| • N | 1123 | 894 | 1377 |
| • Mean, SD | 83 (21) | 83 (21) | 83 (22) |
| • Median, (min, max) | 80 (32, 180) | 80 (30, 180) | 80 (29, 171) |
| | | | |
| Number of distinct episodes of angina in past 24 hours, no. % | | | |
| • 0-2 | 652 (58) | 475 (53) | 891 (64) |
| • >2 | 100 (9) | 37 (4) | 98 (7) |
| • Missing | 379 (34) | 390 (43) | 400 (29) |
| | | | |
| Killip classification code, no. % | | | |
| • I | 573 (51) | 426 (47) | 669 (48) |
| • II | 208 (18) | 126 (14) | 258 (19) |
| • III | 48 (4) | 43 (5) | 62 (4) |
| • IV | 24 (2) | 19 (2) | 57 (4) |
| • Not stated/inadequately described | 278 (25) | 288 (32) | 343 (25) |
| | | | |
| Peak CK-MB, Unit/L, no. % | 749 | 514 | 809 |
| • >25 | 352 (47) | 316 (61) | 470 (58) |
| | | | |
| Peak CK, Unit/L, no. % | 1029 | 765 | 1223 |
| • >2x reference upper limits | 319 (31) | 393 (51) | 651 (53) |
| | | | |
| Peak TnT, no. % | 263 | 148 | 245 |
| • Positive or >0.01 | 240 (91) | 141 (95) | 236 (96) |
| Peak TnI, no. % | 77 | 56 | 147 |
| • Positive or > reference upper limit/0.04 | 52 (68) | 46 (82) | 112 (76) |
| | | | |

| | Pre-morbid dyslipidaemia | | |
|---|---|---|---|
| | **Yes N=1131** | **No N=902** | **Not known N=1389** |
| Total cholesterol, mmol/L | | | |
| • N | 777 | 675 | 1019 |
| • Mean, SD | 5.2 (1.3) | 5.3 (1.3) | 5.4 (1.3) |
| • Median, (min, max) | 5.0 (3.0, 10.8) | 5.2 (3.0, 14.3) | 5.3 (3.0, 10.4) |
| | | | |
| HDL-C, mmol/L | | | |
| • N | 784 | 675 | 1017 |
| • Mean, SD | 1.13 (0.36) | 1.16 (0.44) | 1.11 (0.34) |
| • Median, (min, max) | 1.10 (0.50, 4.50) | 1.10 (0.50, 4.94) | 1.10 (0.50, 4.24) |
| | | | |
| LDL-C, mmol/L | | | |
| • N | 763 | 669 | 996 |
| • Mean, SD | 3.13 (1.18) | 3.31 (1.26) | 3.37 (1.21) |
| • Median, (min, max) | 3.00 (1.00, 8.90) | 3.24 (1.00, 10.10) | 3.30 (1.02, 8.20) |
| | | | |
| Triglycerides, mmol/L | | | |
| • N | 685 | 581 | 885 |
| • Mean, SD | 2.12 (1.22) | 2.06 (1.28) | 2.10 (1.37) |
| • Median, (min, max) | 1.80 (1.00, 13.00) | 1.70 (1.00, 12.90) | 1.70 (1.00, 14.00) |
| | | | |
| Left ventricular ejection fraction, % | | | |
| • N | 549 | 470 | 697 |
| • Mean, SD | 47 (14) | 48 (12) | 48 (13) |
| • Median, (min, max) | 47 (10, 80) | 50 (9, 80) | 49 (8, 80) |

*Note: Percentage is to the nearest decimal point.*

Figure 3.2.5a Stratum distribution for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

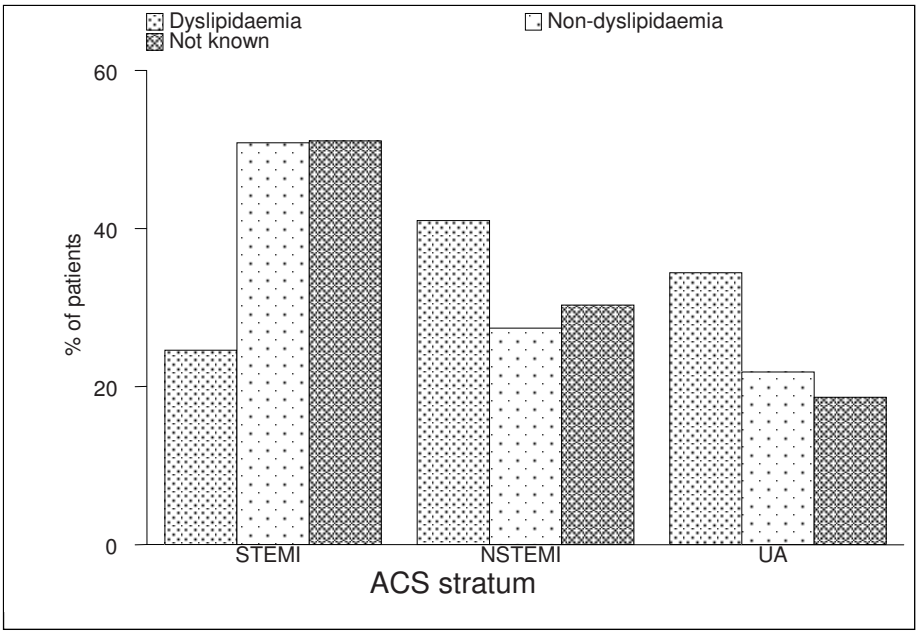



Figure 3.2.5b Number of distinct angina episodes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

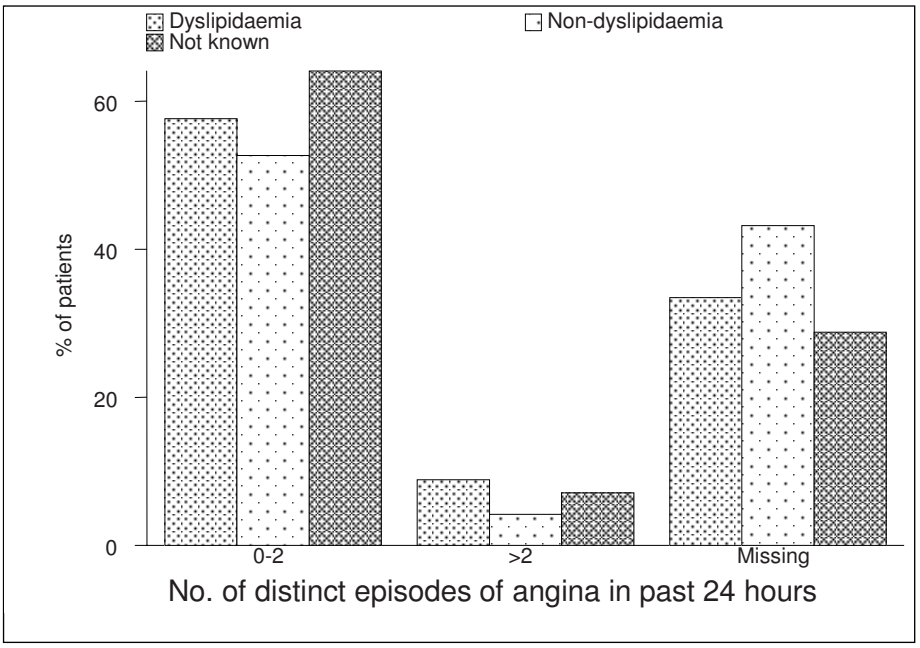
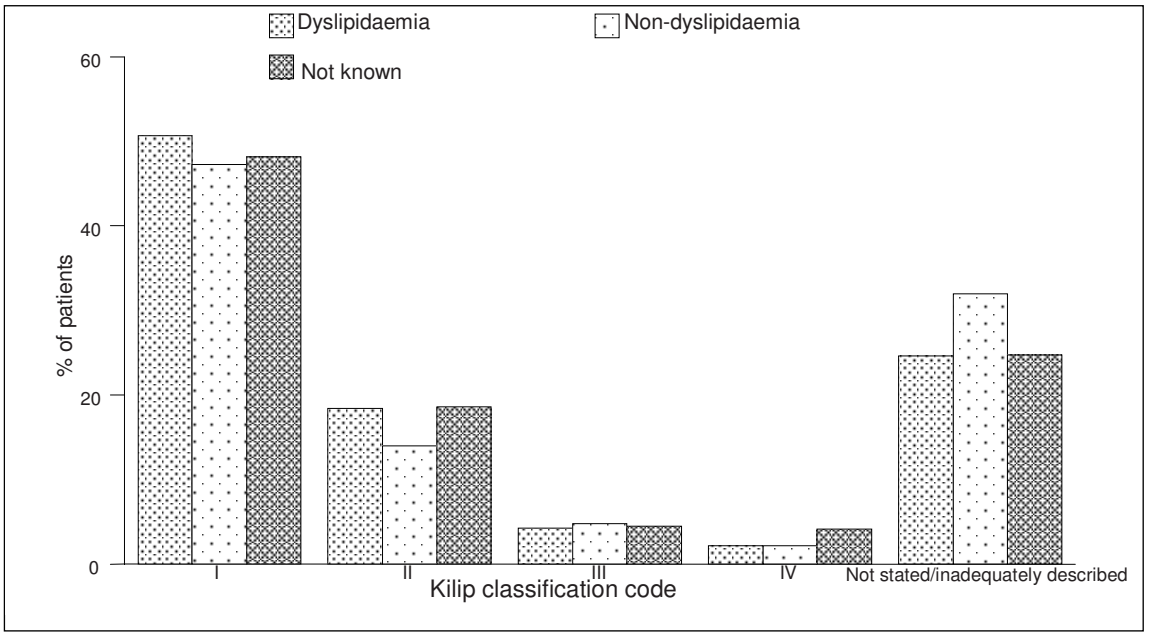


Figure 3.2.5c Killip classification code for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006



# CHAPTER 4

# TREATMENT

**Hazlyna Kamaruddin**

**Azhari Rosman**

**Robaayah Zambahari**

This chapter summarizes management pattern of patients admitted with acute coronary syndrome registered in the ACS registry 2006.

**Admission days**

In general the total admission days in hospital is similar across the ACS strata; that is STEMI 6 days ±3, NSTEMI 6 days ± 4 and UA 5 days ± 4. However, there is an increasing trend of total admission days with increasing age (STEMI; young is 5 days ± 2, middle age is 6 days ± 3, elderly is 7 days ± 4 and NSTEMI/UA; young is 5 ± 2 days, middle age is 5 ± 3 days, elderly is 6 ± 4 days).

A similar pattern is also seen in the number of days in CCU where the days spent after STEMI increases as the age increases with a maximum of 21 days in the middle age and 26 days in the elderly age groups, as compared to 10 days in the young age group. A similar pattern is also seen in the number of days spent in intensive care unit (ICU)/ coronary intensive care unit (CICU) post STEMI, with a generally higher number of days for the middle age and elderly age group with a maximum of 17 days, as compared to only 4 days maximum in the young age group. The young age group patients also spent fewer days in CCU/ICU/CICU post NSTEMI/UA (Table 4.3.1).

In general, no differences are seen in total admission days or number of days admitted to CCU between the different ethnic groups presented with ACS. However, a longer admission into ICU/CICU was seen among the Malays (mean 4 days ± 4) following STEMI, as compared to other ethnic groups (Chinese 2 days ± 2, Indian and other ethnic groups 2 days ± 1). In NSTEMI/UA, the Malay group spent the longest time in CCU/ICU/CICU (24 days) while the lowest was in ethnic groups other than Malays, Chinese and Indian (10 days).

**Treatment of STEMI (Table 4.1)**

Out of the total 1,445 patients with STEMI, 70% received fibrinolytic therapy. The highest proportion of patients who received fibrinolytic therapy was seen in the young age group (aged 20 ≥ X > 40, 78%) versus the middle age (aged 40 ≥ X >60, 75%) and elderly (aged ≥ 60, 62%). The proportion of females treated with fibrinolysis was also lower than males (67% v 71% respectively). Amongst the different ethnic groups, the Malays received the most fibrinolysis treatment (78%) with the lowest proportion being the Indians (66%). However, out of the total of 117 patients who proceeded directly to primary angioplasty, the highest proportion was in the Indian population (13%), followed by Chinese (8%), Malays (7%) and other ethnic groups (6%).

Most of the patients presenting with STEMI were treated conservatively during the same admission with only 308 (21%) having percutaneous coronary intervention (PCI). Most

patients were treated and stabilized medically and referred to a tertiary centre later on as outpatients for further management. There was no difference in the number of PCI among the different age groups. Male patients had a higher proportion of PCI (22%) as compared to the females (16%). When comparing the different ethnic groups that presented with STEMI, the Indian population had the highest proportion of PCI (29%) with the Malay population (18%) accounting for the lowest proportion.

Only a small number (n=10) underwent CABG during the same admission following a STEMI, with mostly in the elderly age group (n=7).

**Treatment of NSTEMI/UA**

Out of the total of 1,977 patients presenting with NSTEMI/UA, the highest number of patients was in the elderly age group (n=1052), followed by middle age (n=872) and young age group (n=53). The majority of patients were treated medically and only 14% of NSTEMI and 9% of UA patients had PCI. There were more number of younger age group patients (19%) compared to middle age group (14%) and elderly age group (11%) who went for PCI. A small number of middle age (n=13, 1%) and elderly patients (n=22, 2%) were transferred to another centre for further intervention. A small number of middle age (n=25) and elderly (n=32) patients had CABG performed during the same admission.

The number of PCI appeared to be lower in females (n=60, 9%) than male (n=182, 14%). There was no significant difference seen in the proportion of patients undergoing PCI among different ethnic groups. The proportion of patients transferred to another centre was also similar among the different ethnic groups.

**Pharmacological treatment of ACS**

Aspirin and statins were used in more than 90% of patients in all the ACS groups with no difference seen in STEMI patients of different genders, age groups and ethnic groups. However, there was a downward trend in the use of aspirin during admission with NSTEMI/UA as the age increased (young 94%, middle age 92% and elderly 89%). Female patients who had NSTEMI/UA also received less treatment with aspirin (88%) as compared to male patients (91%). ADP antagonist use was slightly lower in the UA group (50%) as compared to the STEMI (60%) or NSTEMI groups (64%).

Due to religious beliefs, the use of LMWH in the Malay population was the lowest in both ACS strata (28% in STEMI, 55% in NSTEMI/UA) as compared to the rest of the ethnic groups (Table 4.2.3 and 4.3.3). The use of GP receptor inhibitor was very low in all ACS strata, the highest being in STEMI (n=77, 5%), NSTEMI (n=47, 4%) and UA (n=19, 2%).

Hypoglycaemic agents were mostly used among the Indian population for all ACS presentations, reaching 41% in STEMI and 42% in NSTEMI/UA. Similarly insulin therapy in the Indian patients was also the highest (37% in all ACS) as compared to the other ethnic groups. This may reflect the prevalence of diabetes in the different ethnic groups.

In all the ACS groups, diuretics were used the most amongst the elderly age group (STEMI 37% and NSTEMI 42%). The lowest usage of diuretics was seen in the young patients presenting with STEMI (2%). This is in proportion with the high proportion of Killips Class 1 in the young age group as described in the earlier chapter.

**Summary Points:**

- Patients with ACS stayed an average of 6 days in hospital which included approximately 3 days in CCU. There is an increasing trend of longer duration of hospitalization with increasing age.
- For the STEMI patients 70% received thrombolysis and only 8% proceeded directly to primary angioplasty.
- The highest proportion of patients who received thrombolytic therapy was seen in the young age group, male and Malays.
- Twenty-percent of STEMI patients had PCI during the same admission. Males have a higher proportion of PCI compared to females and Indians have the highest proportion of PCI while Malays had the lowest.
- For NSTEMI/UA, majority of the patients were medically treated. Only 14% of NSTEMI and 9% of UA patients had PCI on the same admission.
- Prescription and utilization of adjunctive proven pharmacological therapy were high in all groups.

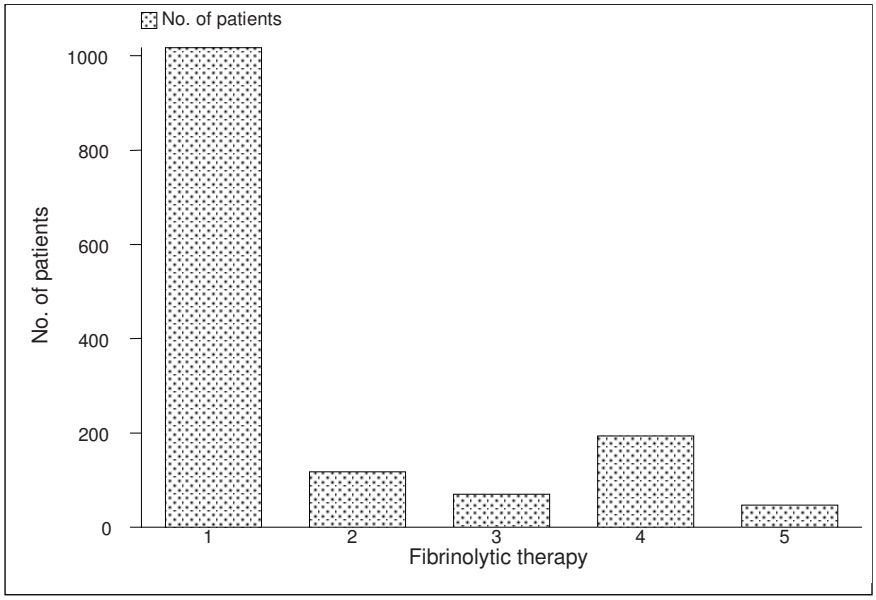
Table 4.1 Summary of treatments for patients with ACS by ACS stratum, Malaysia 2006

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| Total admission days* | | | |
| • N | 1420 | 1104 | 830 |
| • Mean, SD | 6 (3) | 6 (4) | 5 (4) |
| • Median, (min, max) | 5 (1,28) | 5 (1,30) | 4 (1,29) |
| | | | |
| Number of days on CCU | | | |
| • N | 1093 | 450 | 140 |
| • Mean, SD | 3 (3) | 4 (3) | 3 (3) |
| • Median, (min, max) | 3 (1,26) | 3 (1,24) | 2 (1,20) |
| | | | |
| Number of days on ICU/CICU | | | |
| • N | 87 | 110 | 27 |
| • Mean, SD | 3 (3) | 4 (3) | 4 (2) |
| • Median, (min, max) | 2 (1,17) | 3 (1,23) | 4 (1,9) |
| | | | |
| Fibrinolytic therapy, no. % | | | |
| • Given | 1018 (70) | NA | NA |
| • Not given–proceeded directly to primary angioplasty | 117 (8) | NA | NA |
| • Not given-Contraindicated | 70 (5) | NA | NA |
| • Not given–Missed thrombolysis | 193 (13) | NA | NA |
| • Not given–Others** | 47 (3) | NA | NA |
| | | | |
| Cardiac catheterization, no. % | | | |
| • Yes | 298 (21) | 251 (22) | 106 (13) |
| • No | 1106 (77) | 858 (76) | 727 (86) |
| • Number transferred to another centre | 39 (3) | 23 (2) | 12 (1) |
| | | | |
| Percutaneous coronary intervention, no. % | | | |
| • Yes | 308 (21) | 162 (14) | 80 (9) |
| • No | 1137 (79) | 970 (86) | 765 (91) |
| | | | |
| CABG, no. % | | | |
| • Yes | 10 (1) | 42 (4) | 15 (2) |
| • No | 1435 (99) | 1090 (96) | 830 (98) |
| | | | |
| Pre-admission aspirin use, no. % | | | |
| • Yes | 227 (16) | 465 (41) | 372 (44) |
| • No | 965 (67) | 468 (41) | 257 (30) |
| • Unknown | 253 (18) | 199 (18) | 216 (26) |
| | | | |

| | STEMI N=1445 | NSTEMI N=1132 | UA N=845 |
|---|---|---|---|
| Pharmacological therapy given during admission, no. % | | | |
| • Aspirin | 1368 (95) | 1018 (90) | 765 (91) |
| • ADP antagonist | 868 (60) | 719 (64) | 422 (50) |
| • GP receptor inhibitor | 77 (5) | 47 (4) | 19 (2) |
| • Unfractionated heparin | 181 (13) | 203 (18) | 197 (23) |
| • LMWH | 446 (31) | 767 (68) | 537 (64) |
| • Beta blocker | 951 (66) | 737 (65) | 587 (69) |
| • ACE inhibitor | 865 (60) | 597 (53) | 510 (60) |
| • Angiotensin II receptor blocker | 66 (5) | 131 (12) | 70 (8) |
| • Statin | 1333 (92) | 1022 (90) | 769 (91) |
| • Other lipid lowering agent | 54 (4) | 79 (7) | 54 (6) |
| • Diuretics | 393 (27) | 464 (41) | 241 (29) |
| • Calcium antagonist | 94 (7) | 253 (22) | 195 (23) |
| • Oral hypoglycaemic agent | 373 (26) | 364 (32) | 236 (28) |
| • Insulin | 379 (26) | 320 (28) | 183 (22) |
| • Anti-arrhythmic agent | 135 (9) | 72 (6) | 49 (6) |

**Total admission days is derived as Outcome date – Admission date + 1*
***Not given–Others includes missing and refusal*
*Note: Percentage is to the nearest decimal point.*

Figure 4.1.1 Fibrinolytic therapy for patients with STEMI by ACS stratum, Malaysia 2006




*1. Given, 2. Not given–proceeded directly to primary angioplasty, 3. Not given-Contraindicated, 4. Not given–Missed thrombolysis, 5. Not given–Others***

Figure 4.1.2 Cardiac catheterization for patients with ACS by ACS stratum, Malaysia 2006

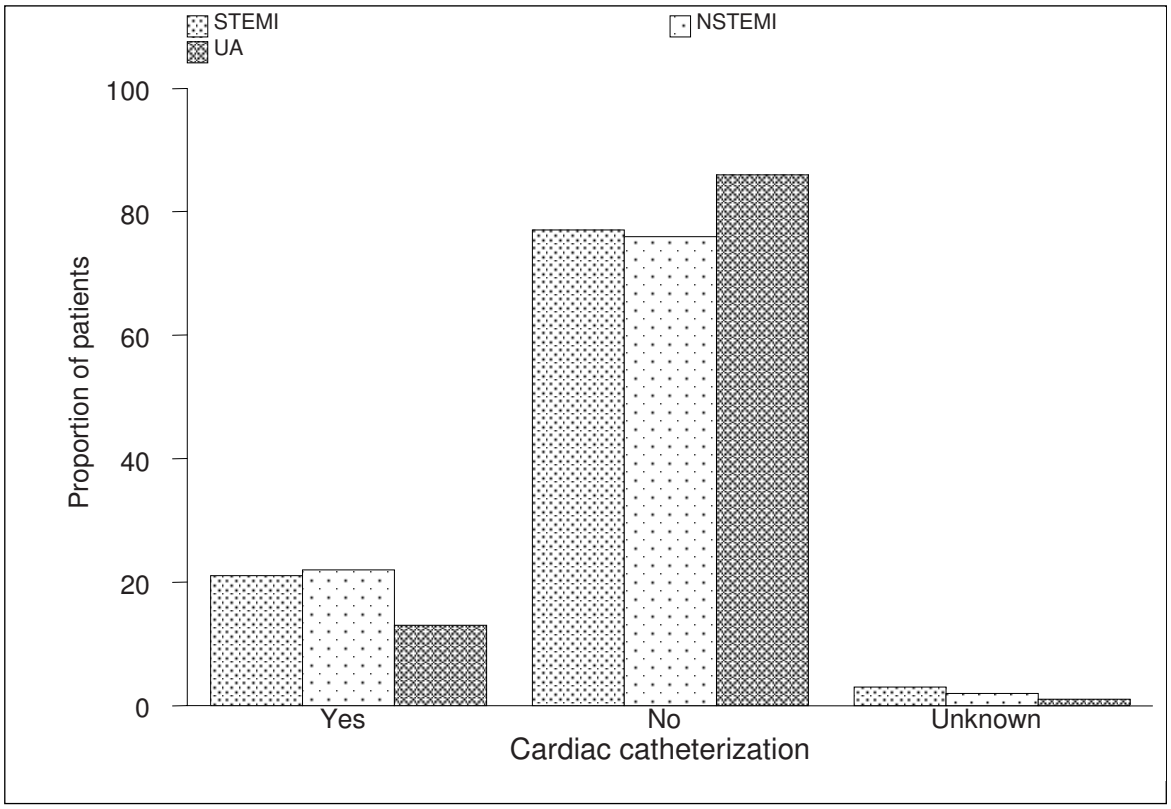


Figure 4.1.3 Percutaneous coronary intervention for patients with ACS by ACS stratum, Malaysia 2006

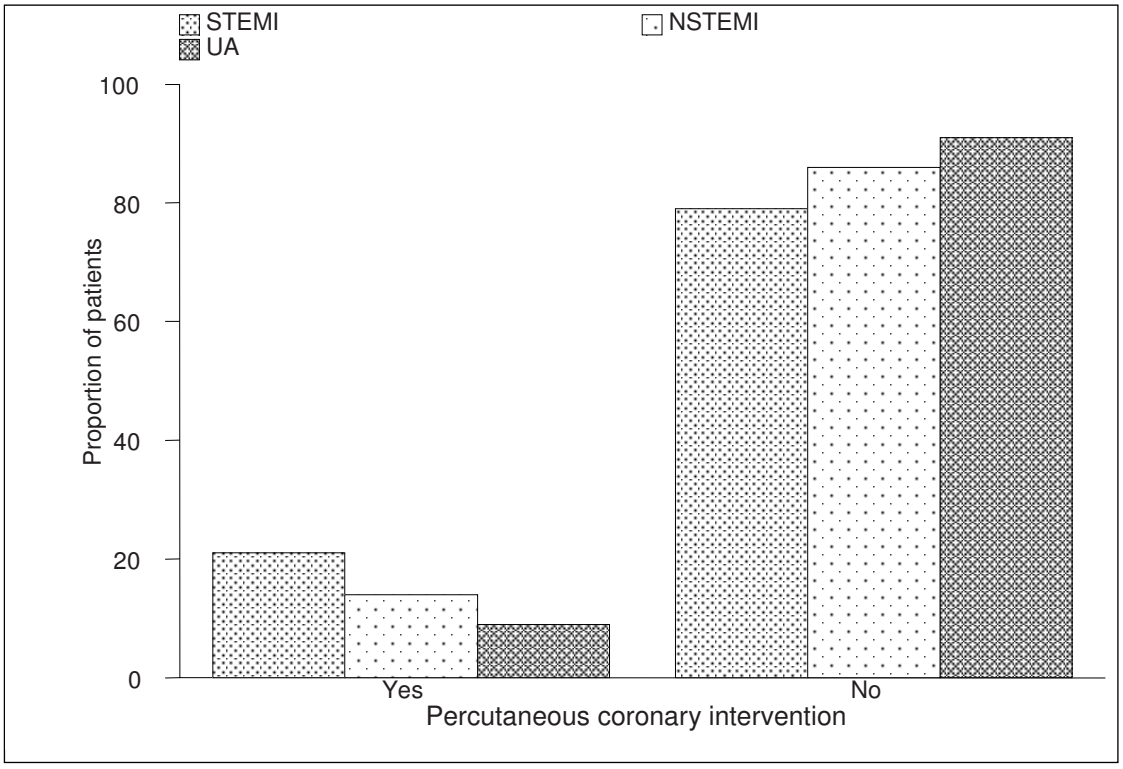



Figure 4.1.4 CABG for patients with ACS by ACS stratum, Malaysia 2006

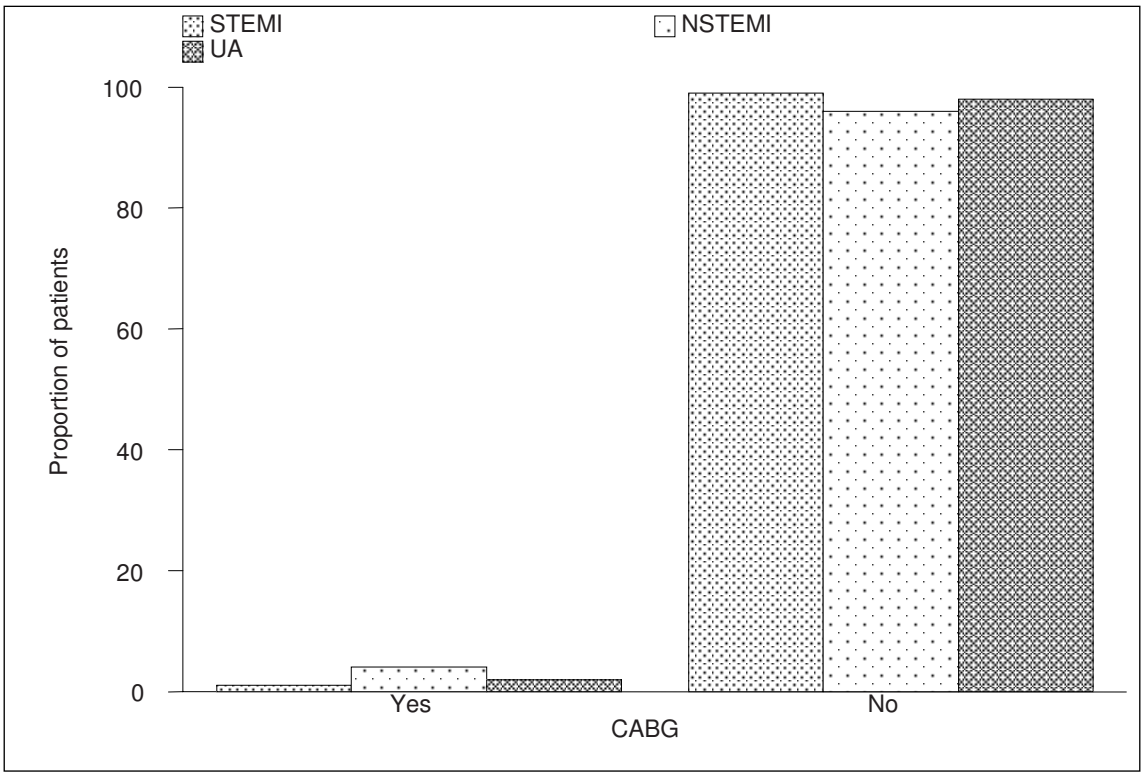


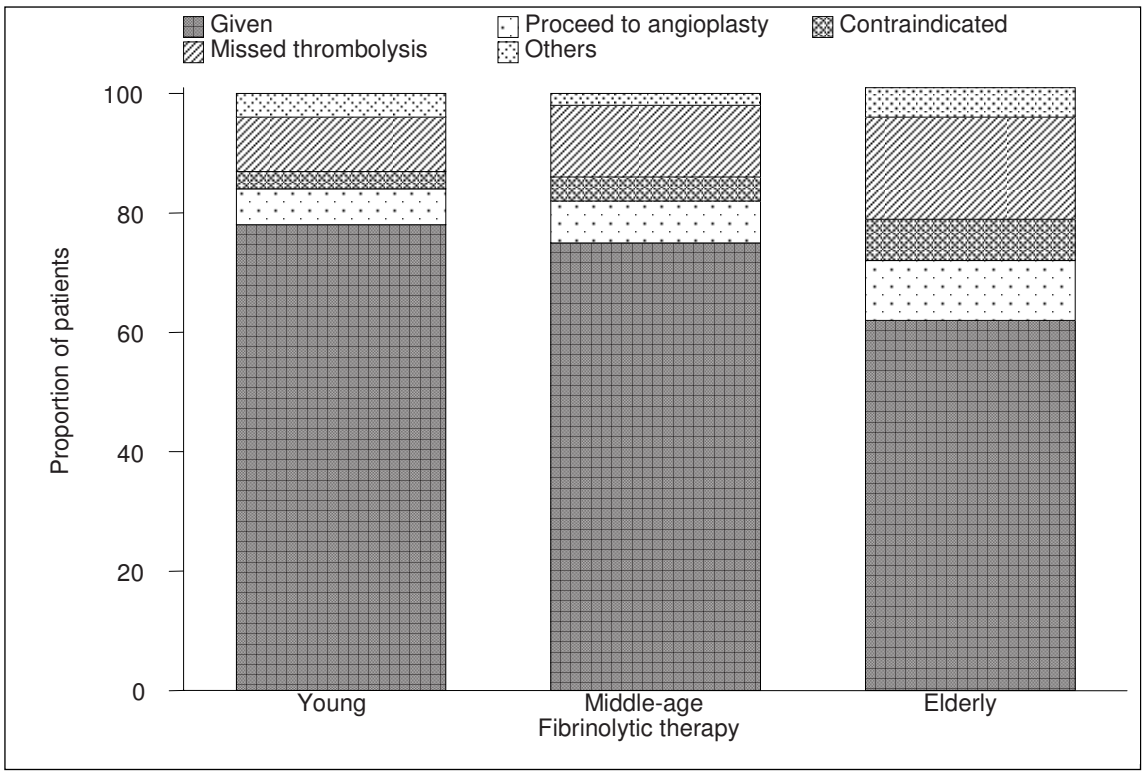
Table 4.2.1 Treatments for patients with STEMI by age group (years), Malaysia 2006

| | Age group* | | |
|---|---|---|---|
| | **Young N=113** | **Middle-age N=803** | **Elderly N=529** |
| Total admission days** | | | |
| • N | 110 | 796 | 514 |
| • Mean, SD | 5 (2) | 6 (3) | 7 (4) |
| • Median, (min, max) | 5 (1,20) | 5 (1,28) | 5 (1,28) |
| | | | |
| Number of days on CCU | | | |
| • N | 86 | 614 | 393 |
| • Mean, SD | 3 (2) | 3 (2) | 4 (3) |
| • Median, (min, max) | 3 (1,10) | 3 (1,21) | 3 (1,26) |
| | | | |
| Number of days on ICU/CICU | | | |
| • N | 7 | 48 | 32 |
| • Mean, SD | 2 (1) | 3 (3) | 4 (4) |
| • Median, (min, max) | 2 (1,4) | 2 (1,17) | 3 (1,17) |
| | | | |
| Fibrinolytic therapy, no. % | | | |
| • Given | 88 (78) | 601 (75) | 329 (62) |
| • Not given–proceeded directly to primary angioplasty | 7 (6) | 59 (7) | 51 (10) |
| • Not given– Contraindicated | 3 (3) | 31 (4) | 36 (7) |
| • Not given–Missed thrombolysis | 10 (9) | 94 (12) | 89 (17) |
| • Not given – Others*** | 5 (4) | 18 (2) | 24 (5) |
| | | | |
| Cardiac catheterization, no. % | | | |
| • Yes | 27 (24) | 171 (21) | 100 (19) |
| • No | 81 (72) | 612 (76) | 413 (78) |
| • No-Transferred to another centre | 5 (4) | 19 (2) | 15 (3) |
| | | | |
| Percutaneous coronary intervention, no. % | | | |
| • Yes | 25 (22) | 180 (22) | 103 (19) |
| • No | 88 (78) | 623 (78) | 426 (81) |
| | | | |
| CABG, no. % | | | |
| • Yes | 0 (0) | 3 (0) | 7 (1) |
| • No | 113 (100) | 800 (100) | 522 (99) |
| | | | |
| Pre-admission aspirin use, no. % | | | |
| • Yes | 10 (9) | 111 (14) | 106 (20) |
| • No | 89 (79) | 536 (67) | 340 (64) |
| • Unknown | 14 (12) | 156 (19) | 83 (16) |
| | | | |

| | Age group* | | |
|---|---|---|---|
| | **Young N=113** | **Middle-age N=803** | **Elderly N=529** |
| Pharmacological therapy given during admission, no. % | | | |
| • ASA | 110 (97) | 760 (95) | 498 (94) |
| • ADP antagonist | 69 (61) | 452 (56) | 347 (66) |
| • GP receptor inhibitor | 7 (6) | 42 (5) | 28 (5) |
| • Unfractionated heparin | 10 (9) | 105 (13) | 66 (12) |
| • LMWH | 44 (39) | 232 (29) | 170 (32) |
| • Beta blocker | 86 (76) | 555 (69) | 310 (59) |
| • ACE inhibitor | 68 (60) | 506 (63) | 291 (55) |
| • Angiotensin II receptor blocker | 6 (5) | 39 (5) | 21 (4) |
| • Statin | 105 (93) | 750 (93) | 478 (90) |
| • Other lipid lowering agent | 10 (9) | 29 (4) | 15 (3) |
| • Diuretics | 13 (12) | 184 (23) | 196 (37) |
| • Calcium antagonist | 3 (3) | 46 (6) | 45 (9) |
| • Oral hypoglycaemic agent | 22 (19) | 229 (29) | 122 (23) |
| • Insulin | 22 (19) | 221 (28) | 136 (26) |
| • Anti-arrhythmic agent | 7 (6) | 71 (9) | 57 (11) |

**Young is defined as age from 20 to less than 40 years, middle-age is defined as age between 40 to less than 60 years and elderly is defined as 60 years and above.*
***Total admission days is derived as Outcome date – Admission date + 1*
****Not given–Others includes missing and refusal*
*Note: Percentage is to the nearest decimal point.*

Figure 4.2.1a Fibrinolytic therapy for patients with STEMI by age group, Malaysia 2006




*1. Given, 2. Not given–proceeded directly to primary angioplasty, 3. Not given-Contraindicated, 4. Not given–Missed thrombolysis, 5. Not given–Others***

*** Others includes patients who refused the fibrinolytic therapy and missing*

*Note: Percentage is to the nearest decimal point.*

Figure 4.2.1b Cardiac catheterization for patients with STEMI by age group, Malaysia 2006

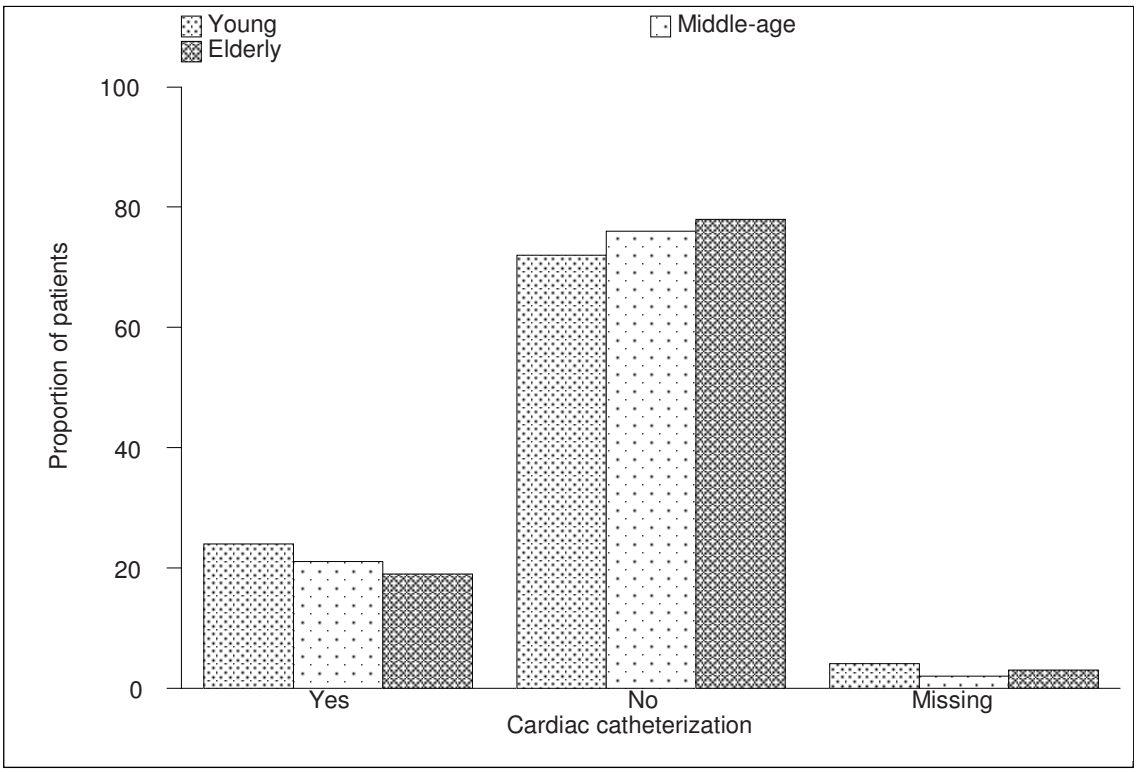



Figure 4.2.1c Percutaneous coronary intervention for patients with STEMI by age group, Malaysia 2006

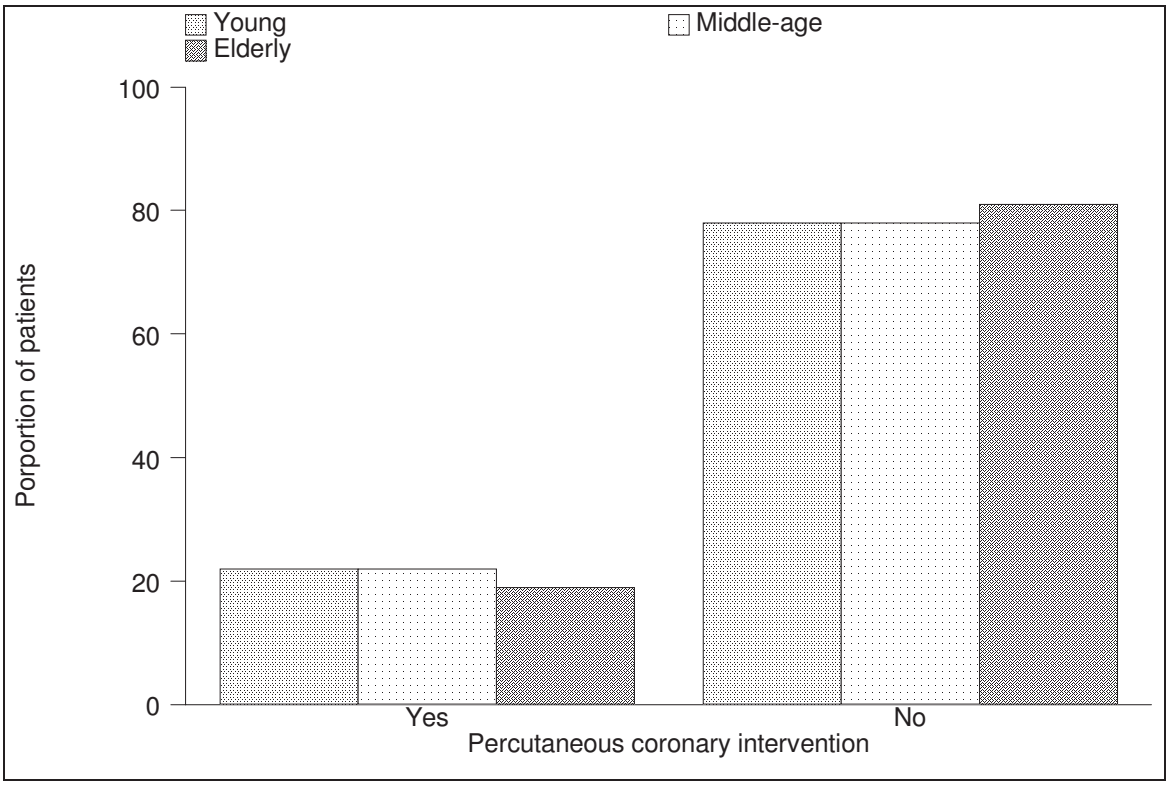


Figure 4.2.1d CABG for patients with STEMI by age group, Malaysia 2006

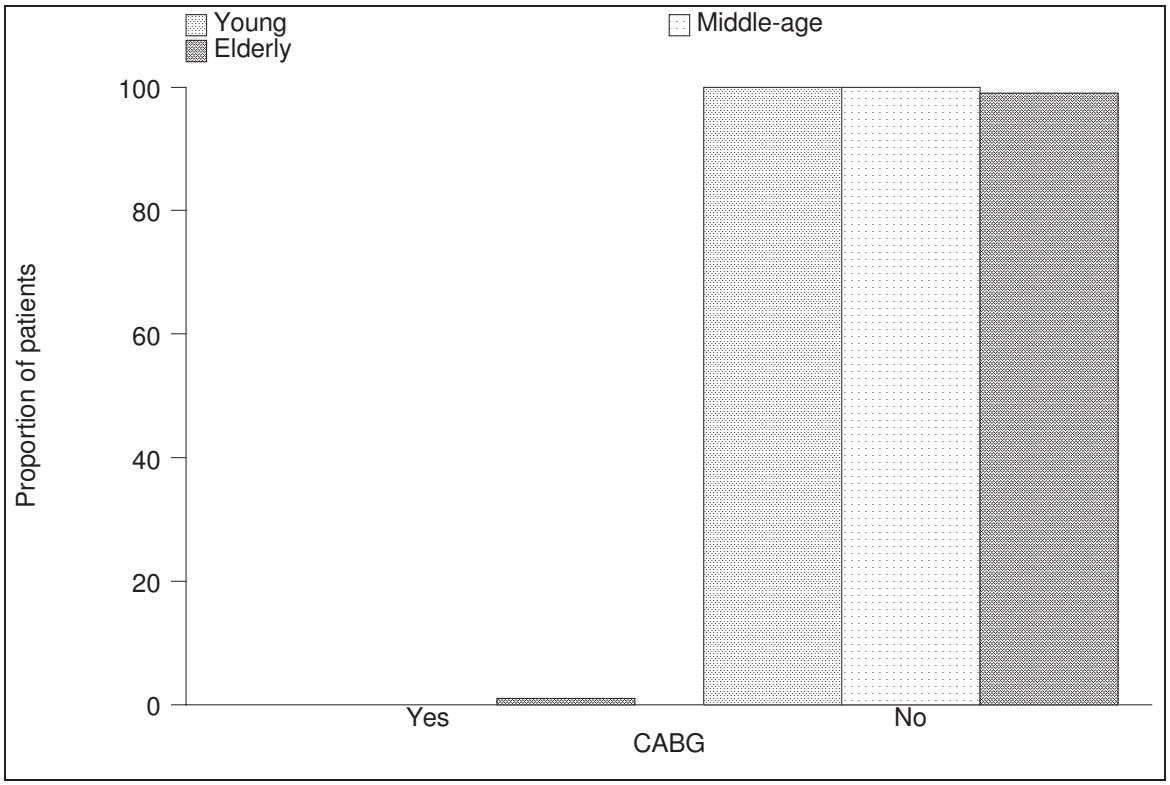


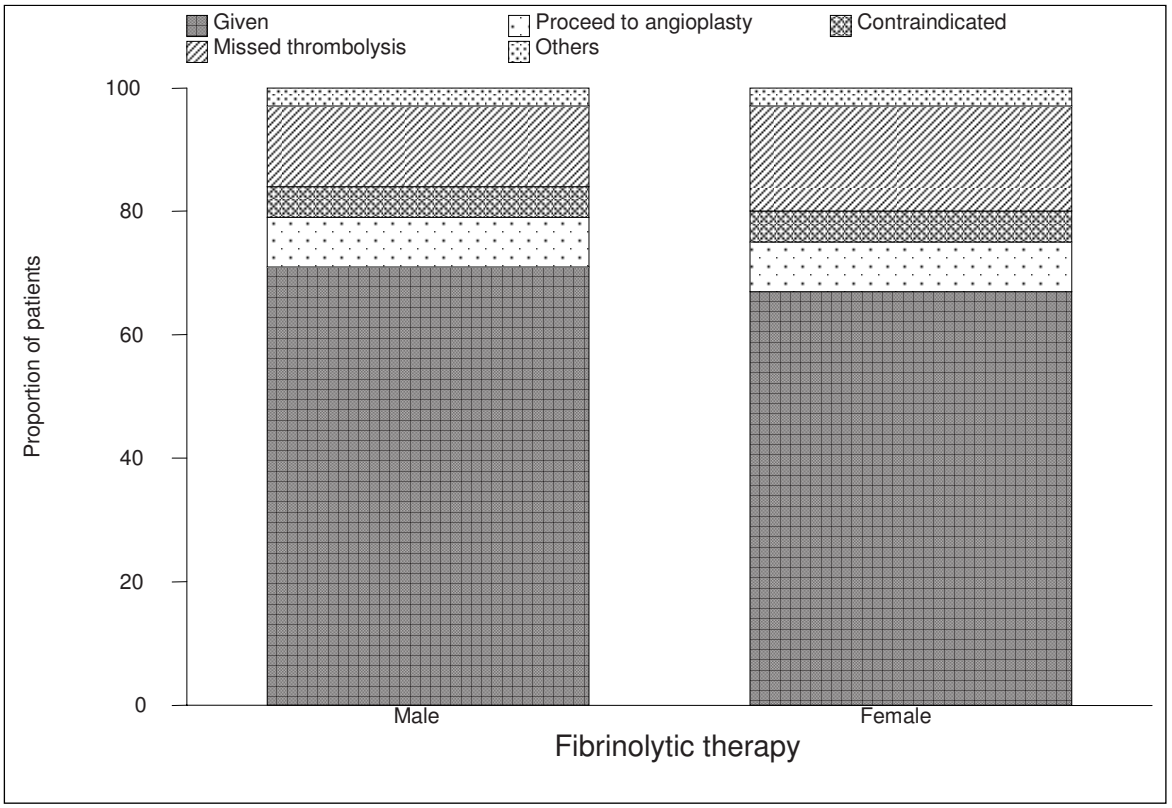
Table 4.2.2 Treatments for patients with STEMI by gender, Malaysia 2006

| | **Male N=1230** | **Female N=215** |
|---|---|---|
| Total admission days* | | |
| • N | 1211 | 209 |
| • Mean, SD | 6 (3) | 7 (4) |
| • Median, (min, max) | 5 (1,28) | 5 (1,28) |
| | | |
| Number of days on CCU | | |
| • N | 936 | 157 |
| • Mean, SD | 3 (3) | 4 (3) |
| • Median, (min, max) | 3 (1,26) | 3 (1,21) |
| | | |
| Number of days on ICU/CICU | | |
| • N | 68 | 19 |
| • Mean, SD | 3 (3) | 3 (2) |
| • Median, (min, max) | 2 (1,17) | 2 (1,7) |
| | | |
| Fibrinolytic therapy, no. % | | |
| • Given | 875 (71) | 143 (67) |
| • Not given–proceeded directly to primary angioplasty | 99 (8) | 18 (8) |
| • Not given-Contraindicated | 59 (5) | 11 (5) |
| • Not given-Missed thrombolysis | 156 (13) | 37 (17) |
| • Not given–Others** | 41 (3) | 6 (3) |
| | | |
| Cardiac catheterization, no. % | | |
| • Yes | 266 (22) | 32 (15) |
| • No | 929 (76) | 177 (82) |
| • No-Transferred to another centre | 33 (3) | 6 (3) |
| | | |
| Percutaneous coronary intervention, no. % | | |
| • Yes | 273 (22) | 35 (16) |
| • No | 957 (78) | 180 (84) |
| | | |
| CABG, no. % | | |
| • Yes | 9 (1) | 1 (0) |
| • No | 1221 (99) | 214 (100) |
| | | |
| Pre-admission aspirin use, no. % | | |
| • Yes | 189 (15) | 38 (18) |
| • No | 824 (67) | 141 (66) |
| • Unknown | 217 (18) | 36 (17) |
| | | |

| | Male N=1230 | Female N=215 |
|---|---|---|
| Pharmacological therapy given during admission, no. % | | |
| • ASA | 1164 (95) | 204 (95) |
| • ADP antagonist | 726 (59) | 142 (66) |
| • GP receptor inhibitor | 65 (5) | 12 (6) |
| • Unfractionated heparin | 156 (13) | 25 (12) |
| • LMWH | 371 (30) | 75 (35) |
| • Beta blocker | 812 (66) | 139 (65) |
| • ACE inhibitor | 759 (62) | 106 (49) |
| • Angiotensin II receptor blocker | 56 (5) | 10 (5) |
| • Statin | 1136 (92) | 197 (92) |
| • Other lipid lowering agent | 45 (4) | 9 (4) |
| • Diuretics | 316 (26) | 77 (36) |
| • Calcium antagonist | 79 (6) | 15 (7) |
| • Oral hypoglycaemic agent | 307 (25) | 66 (31) |
| • Insulin | 290 (24) | 89 (41) |
| • Anti-arrhythmic agent | 112 (9) | 23 (11) |

**Total admission days is derived as Outcome date – Admission date + 1*
***Not given–Others includes missing and refusal*
*Note: Percentage is to the nearest decimal point.*

Figure 4.2.2a Fibrinolytic therapy for patients with STEMI by gender, Malaysia 2006




*1. Given, 2. Not given–proceeded directly to primary angioplasty, 3. Not given-Contraindicated, 4. Not given–Missed thrombolysis, 5. Not given–Others***

*** Others includes patients who refused the fibrinolytic therapy and missing*

*Note: Percentage is to the nearest decimal point.*

Figure 4.2.2b Cardiac catheterization for patients with STEMI by gender, Malaysia 2006

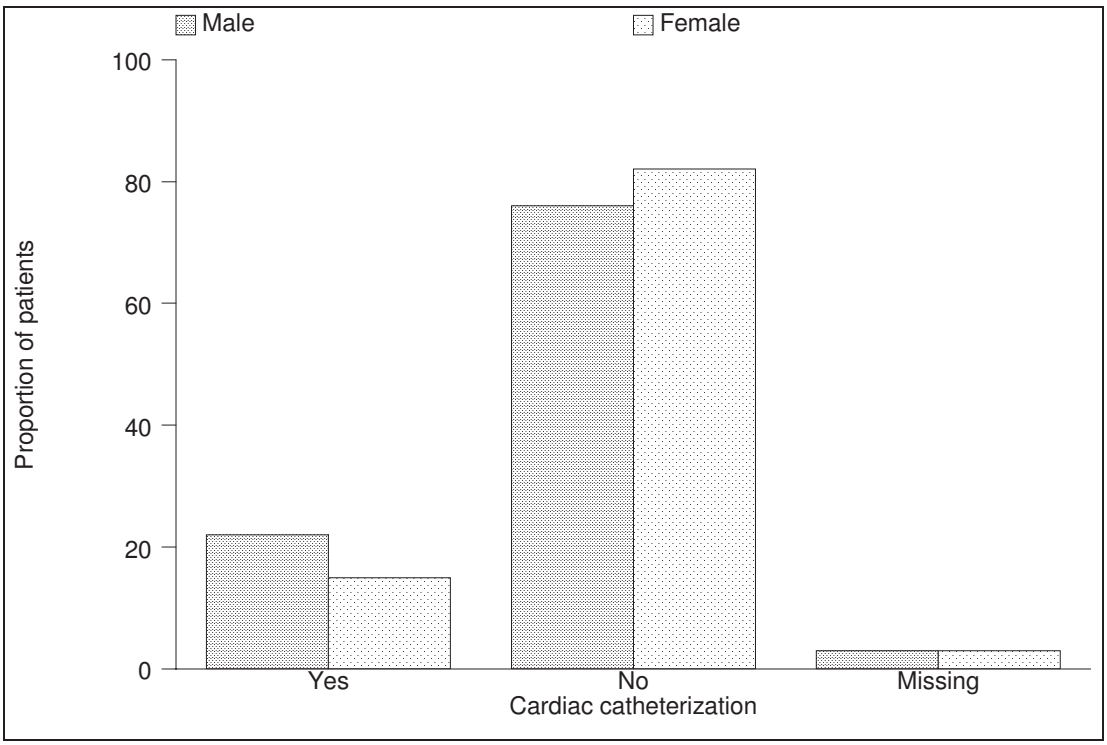



Figure 4.2.2c Percutaneous coronary intervention for patients with STEMI by gender, Malaysia 2006

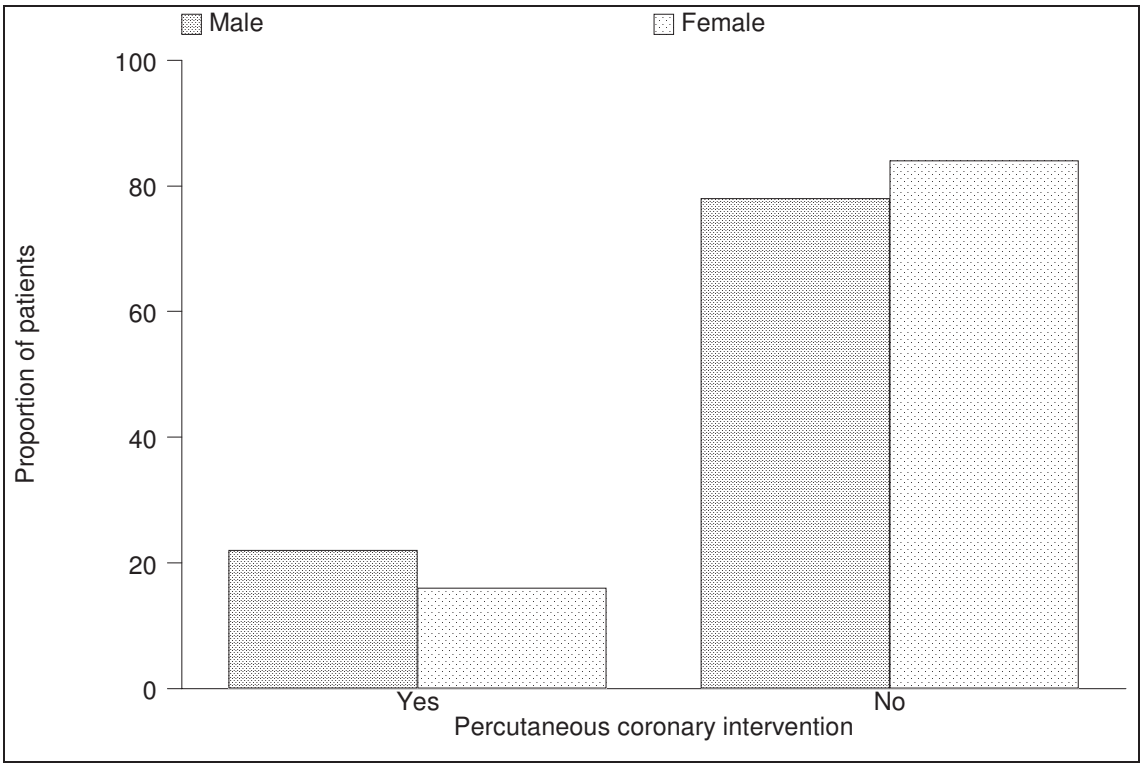


Figure 4.2.2d CABG for patients with STEMI by gender, Malaysia 2006

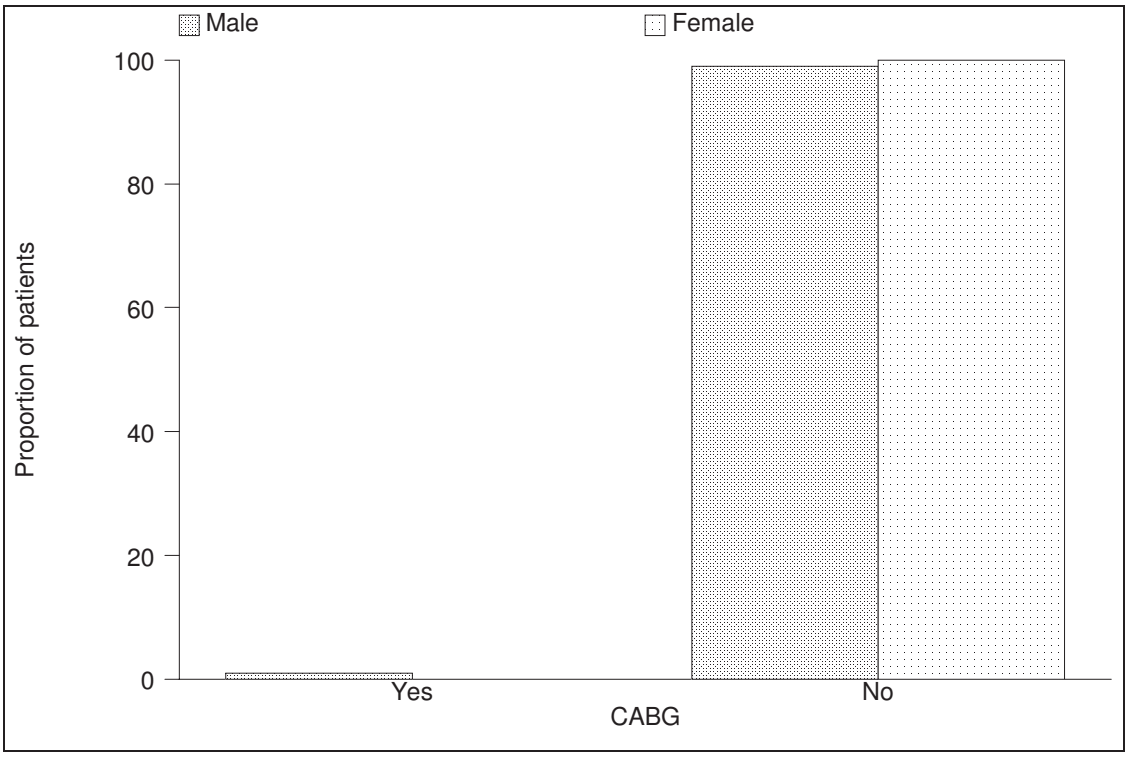


Table 4.2.3 Treatments for patients with STEMI by ethnic group, Malaysia 2006

| | **Malay N=780** | **Chinese N=301** | **Indian N=286** | **Others* N=78** |
|---|---|---|---|---|
| Total admission days** | | | | |
| • N | 764 | 294 | 284 | 78 |
| • Mean, SD | 6 (3) | 6 (3) | 6 (4) | 5 (3) |
| • Median, (min, max) | 5 (1,28) | 5 (1,28) | 5 (1,27) | 5 (1,25) |
| | | | | |
| Number of days on CCU | | | | |
| • N | 614 | 225 | 187 | 67 |
| • Mean, SD | 4 (2) | 3 (2) | 4 (3) | 3 (2) |
| • Median, (min, max) | 3 (1,21) | 3 (1,15) | 3 (1,26) | 3 (1,10) |
| | | | | |
| Number of days on ICU/CICU | | | | |
| • N | 43 | 23 | 3 | 18 |
| • Mean, SD | 4 (4) | 2 (2) | 2 (1) | 2 (1) |
| • Median, (min, max) | 2 (1,17) | 2 (1,8) | 2 (1,2) | 2 (1,4) |
| | | | | |
| Fibrinolytic therapy, no. % | | | | |
| • Given | 567 (73) | 206 (68) | 188 (66) | 57 (73) |
| • Not given–proceeded directly to primary angioplasty | 52 (7) | 24 (8) | 36 (13) | 5 (6) |
| • Not given-Contraindicated | 39 (5) | 14 (5) | 11 (4) | 6 (8) |
| • Not given-Missed thrombolysis | 99 (13) | 43 (14) | 42 (15) | 9 (12) |
| • Not given– Others*** | 23 (3) | 14 (5) | 9 (3) | 1 (1) |
| | | | | |
| Cardiac catheterization, no. % | | | | |
| • Yes | 141 (18) | 64 (21) | 75 (26) | 18 (23) |
| • No | 617 (79) | 231 (77) | 203 (71) | 55 (71) |
| • No-Transferred to another centre | 20 (3) | 6 (2) | 8 (3) | 5 (6) |
| Percutaneous coronary intervention, no. % | | | | |
| • Yes | 143 (18) | 66 (22) | 83 (29) | 16 (21) |
| • No | 637 (82) | 235 (78) | 203 (71) | 62 (79) |
| | | | | |
| CABG, no. % | | | | |
| • Yes | 8 (1) | 2 (1) | 0 (0) | 0 (0) |
| • No | 772 (99) | 299 (99) | 286 (100) | 78 (100) |
| | | | | |
| Pre-admission aspirin use, no. % | | | | |
| • Yes | 112 (14) | 44 (15) | 66 (23) | 5 (6) |
| • No | 554 (71) | 197 (65) | 164 (57) | 50 (64) |
| • Unknown | 114 (15) | 60 (20) | 56 (20) | 23 (29) |
| | | | | |

| | Malay N=780 | Chinese N=301 | Indian N=286 | Others* N=78 |
|---|---|---|---|---|
| Pharmacological therapy given during admission, no. % | | | | |
| • ASA | 731 (94) | 293 (97) | 271 (95) | 73 (94) |
| • ADP antagonist | 441 (57) | 194 (64) | 183 (64) | 50 (64) |
| • GP receptor inhibitor | 44 (6) | 10 (3) | 19 (7) | 4 (5) |
| • Unfrac heparin | 120 (15) | 21 (7) | 38 (13) | 2 (3) |
| • LMWH | 218 (28) | 96 (32) | 104 (36) | 28 (36) |
| • Beta blocker | 504 (65) | 209 (69) | 193 (67) | 45 (58) |
| • ACE inhibitor | 478 (61) | 165 (55) | 184 (64) | 38 (49) |
| • Angiotensin II receptor blocker | 30 (4) | 14 (5) | 18 (6) | 4 (5) |
| • Statin | 714 (92) | 281 (93) | 265 (93) | 73 (94) |
| • Other lipid lowering agent | 31 (4) | 10 (3) | 11 (4) | 2 (3) |
| • Diuretics | 234 (30) | 64 (21) | 80 (28) | 15 (19) |
| • Calcium antagonist | 55 (7) | 10 (3) | 21 (7) | 8 (10) |
| • Oral hypoglycaemic agent | 178 (23) | 69 (23) | 116 (41) | 10 (13) |
| • Insulin | 184 (24) | 73 (24) | 107 (37) | 15 (19) |
| • Anti-arrhythmic agent | 65 (8) | 37 (12) | 25 (9) | 8 (10) |

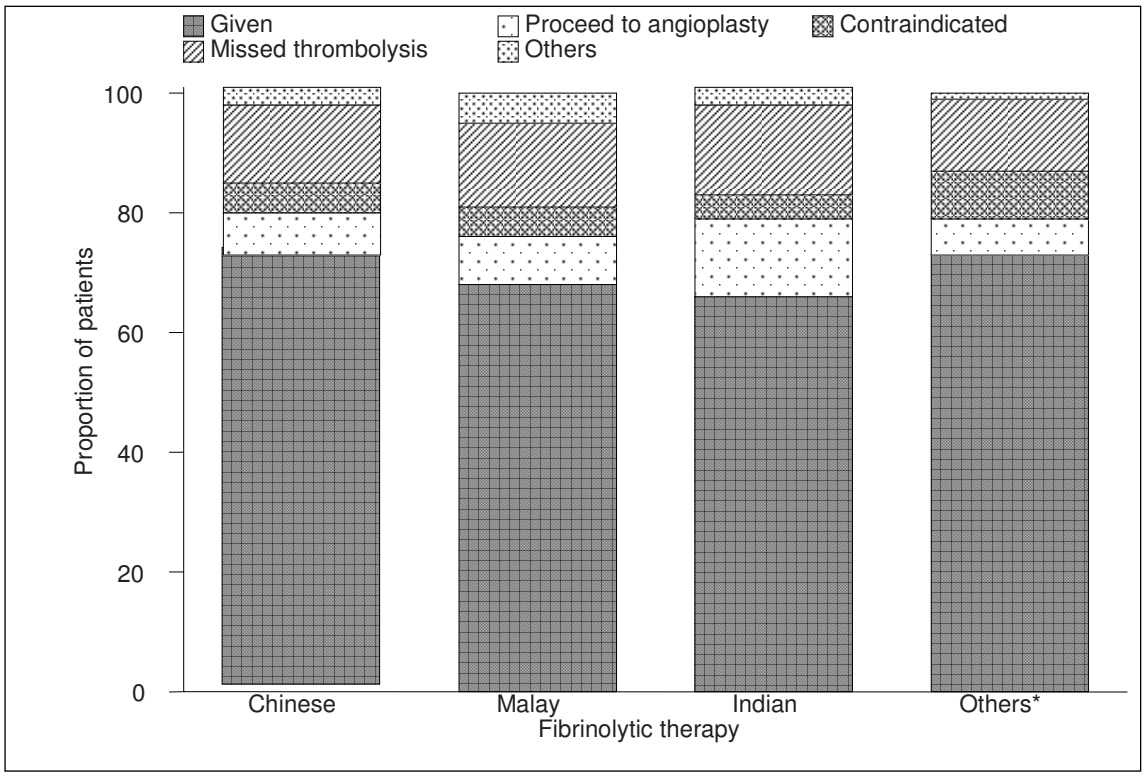
**Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

***Total admission days is derived as Outcome date – Admission date + 1*

****Not given–Others includes missing and refusal*

*Note: Percentage is to the nearest decimal point.*

Figure 4.2.3a Fibrinolytic therapy for patients with STEMI by ethnic group, Malaysia 2006




*1. Given, 2. Not given–proceeded directly to primary angioplasty, 3. Not given-Contraindicated, 4. Not given–Missed thrombolysis, 5. Not given–Others***

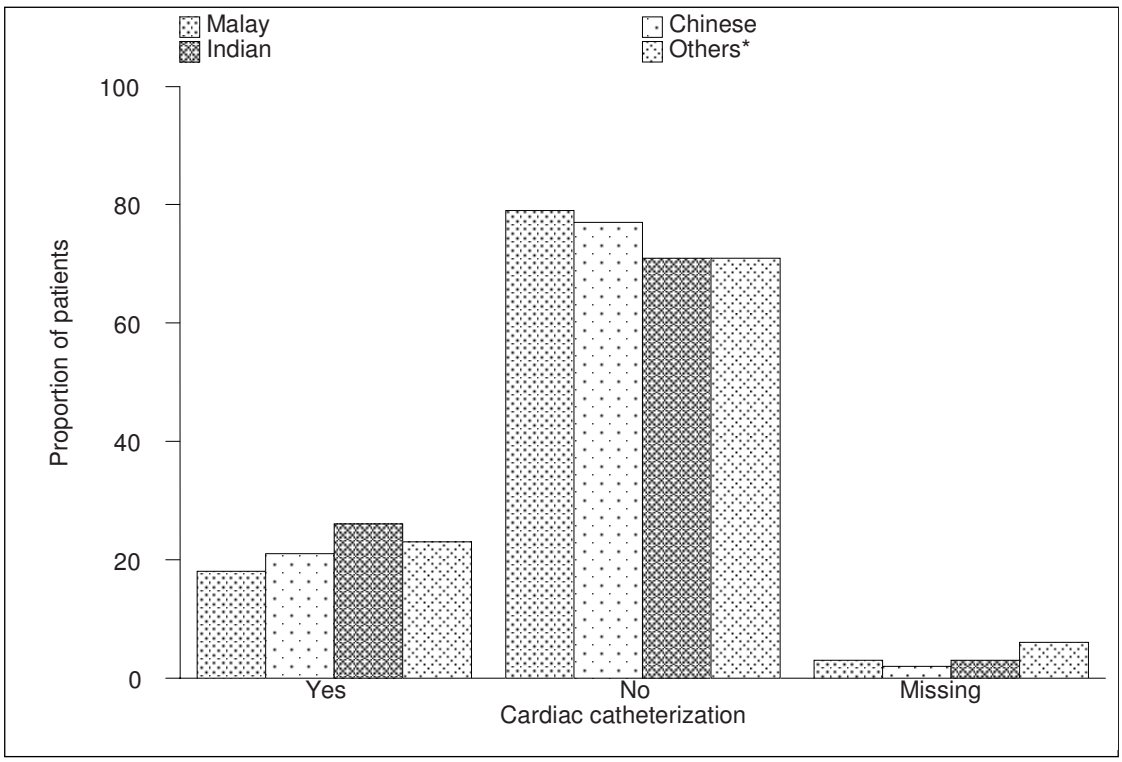
** *Others include Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

*Note:*

*1. Percentage is to the nearest decimal point.*

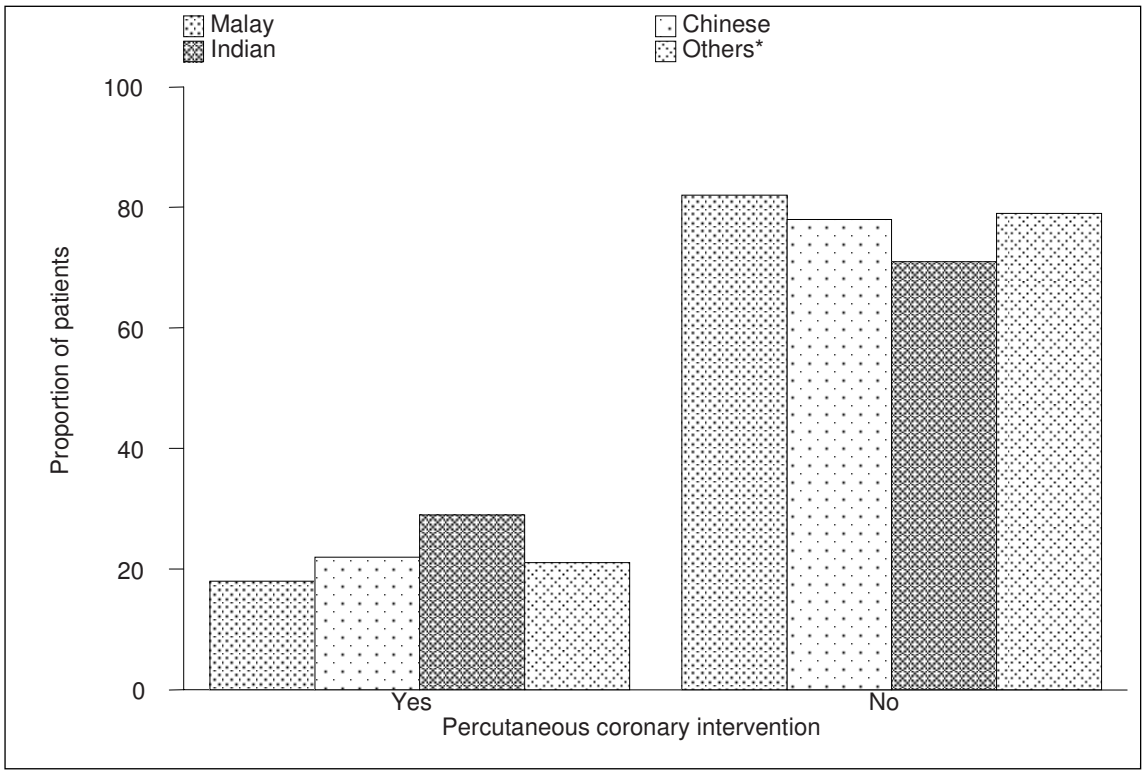
*2. Others includes patients who refused the fibrinolytic therapy and missing*

Figure 4.2.3b Cardiac catheterization for patients with STEMI by ethnic group, Malaysia 2006



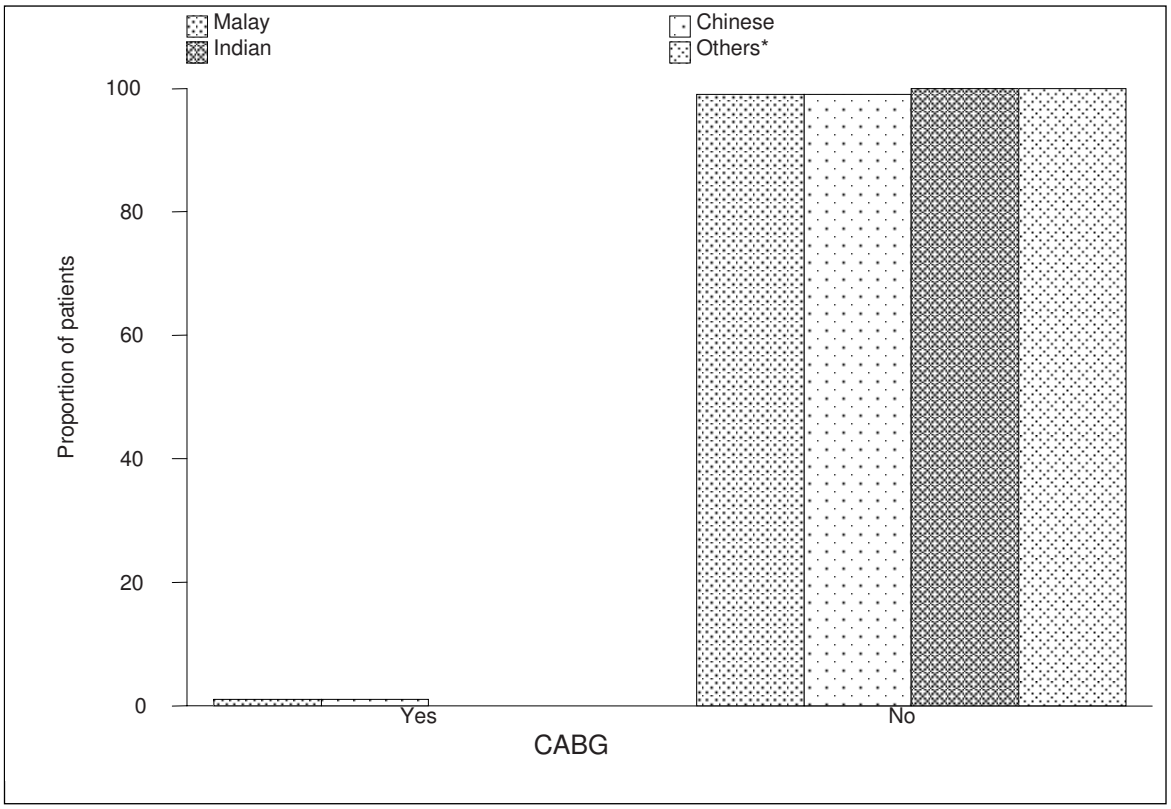

** Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

Figure 4.2.3c Percutaneous coronary intervention for patients with STEMI by ethnic group, Malaysia 2006




**Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

Figure 4.2.3d CABG on admission for patients with STEMI by ethnic group, Malaysia 2006




***Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

Table 4.3.1 Treatments for patients with NSTEMI/UA by age group (years), Malaysia 2006

| | Age group* | | |
|---|---|---|---|
| | **Young N=53** | **Middle-age N=872** | **Elderly N=1052** |
| Total admission days** | | | |
| • N | 53 | 856 | 1025 |
| • Mean, SD | 5 (2) | 5 (3) | 6 (4) |
| • Median, (min, max) | 4 (2,15) | 4 (1,27) | 5 (1,30) |
| | | | |
| Number of days on CCU | | | |
| • N | 14 | 246 | 330 |
| • Mean, SD | 2 (1) | 3 (3) | 3 (3) |
| • Median, (min, max) | 2 (1,5) | 3 (1,20) | 3 (1,24) |
| | | | |
| Number of days on ICU/CICU | | | |
| • N | 1 | 62 | 74 |
| • Mean, SD | 1 (.) | 4 (3) | 4 (3) |
| • Median, (min, max) | 1 (1,1) | 3 (1,12) | 3 (1,23) |
| | | | |
| Cardiac catheterization, no. % | | | |
| • Yes | 11 (21) | 164 (19) | 182 (17) |
| • No | 42 (79) | 695 (80) | 848 (81) |
| • No-Transferred to another centre | 0 (0) | 13 (1) | 22 (2) |
| | | | |
| Percutaneous coronary intervention, no. % | | | |
| • Yes | 10 (19) | 120 (14) | 112 (11) |
| • No | 43 (81) | 752 (86) | 940 (89) |
| | | | |
| CABG, no. % | | | |
| • Yes | 0 (0) | 25 (3) | 32 (3) |
| • No | 53 (100) | 847 (97) | 1020 (97) |
| | | | |
| Pre-admission aspirin use | | | |
| • Yes | 13 (25) | 341 (39) | 483 (46) |
| • No | 25 (47) | 343 (39) | 357 (34) |
| • Unknown | 15 (28) | 188 (22) | 212 (20) |
| | | | |

| | Age group* | | |
|---|---|---|---|
| | **Young N=53** | **Middle-age N=872** | **Elderly N=1052** |
| Pharmacological therapy given during admission, no. % | | | |
| • ASA | 50 (94) | 801 (92) | 932 (89) |
| • ADP antagonist | 28 (53) | 493 (57) | 620 (59) |
| • GP receptor inhibitor | 0 (0) | 27 (3) | 39 (4) |
| • Unfractionated heparin | 14 (26) | 200 (23) | 186 (18) |
| • LMWH | 28 (53) | 566 (65) | 710 (67) |
| • Beta blocker | 34 (64) | 613 (70) | 677 (64) |
| • ACE inhibitor | 26 (49) | 503 (58) | 578 (55) |
| • Angiotensin II receptor blocker | 4 (8) | 75 (9) | 122 (12) |
| • Statin | 48 (91) | 804 (92) | 939 (89) |
| • Other lipid lowering agent | 4 (8) | 64 (7) | 65 (6) |
| • Diuretics | 14 (26) | 249 (29) | 442 (42) |
| • Calcium antagonist | 9 (17) | 156 (18) | 283 (27) |
| • Oral hypoglycaemic agent | 8 (15) | 262 (30) | 330 (31) |
| • Insulin | 12 (23) | 218 (25) | 273 (26) |
| • Anti-arrhythmic agent | 3 (6) | 45 (5) | 73 (7) |

**Young is defined as age from 20 to less than 40 years, middle-age is defined as age between 40 to less than 60 years and elderly is defined as 60 years and above.*
***Total admission days is derived as Outcome date – Admission date + 1*
*Note: Percentage is to the nearest decimal point.*

Figure 4.3.1a Cardiac catheterization for patients with NSTEMI/UA by age group (years), Malaysia 2006

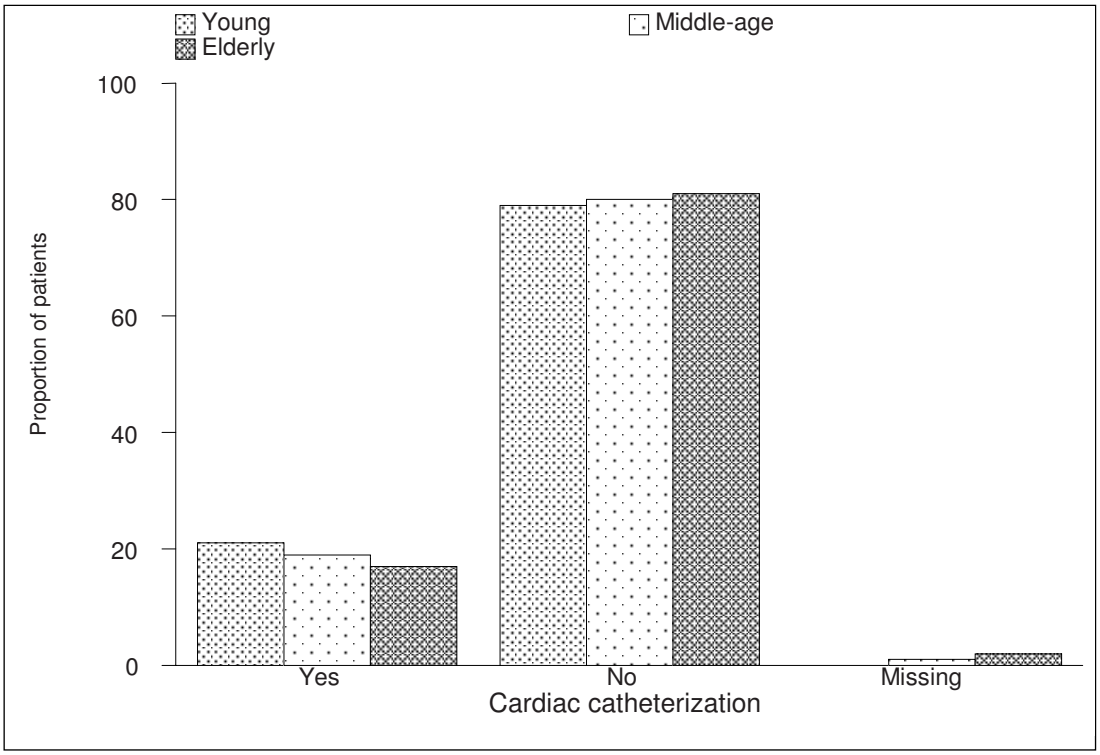



Figure 4.3.1b Percutaneous coronary intervention for patients with NSTEMI/UA by age group (years), Malaysia 2006

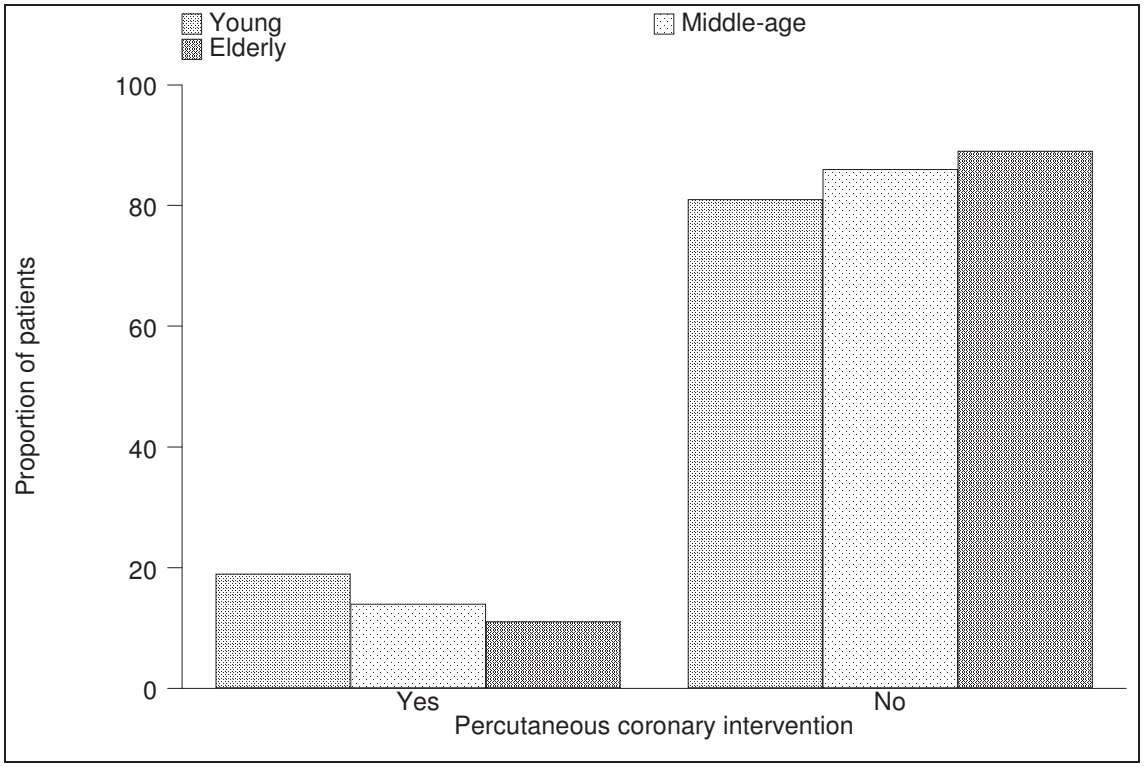


Figure 4.3.1c CABG for patients with NSTEMI/UA by age group (years), Malaysia 2006

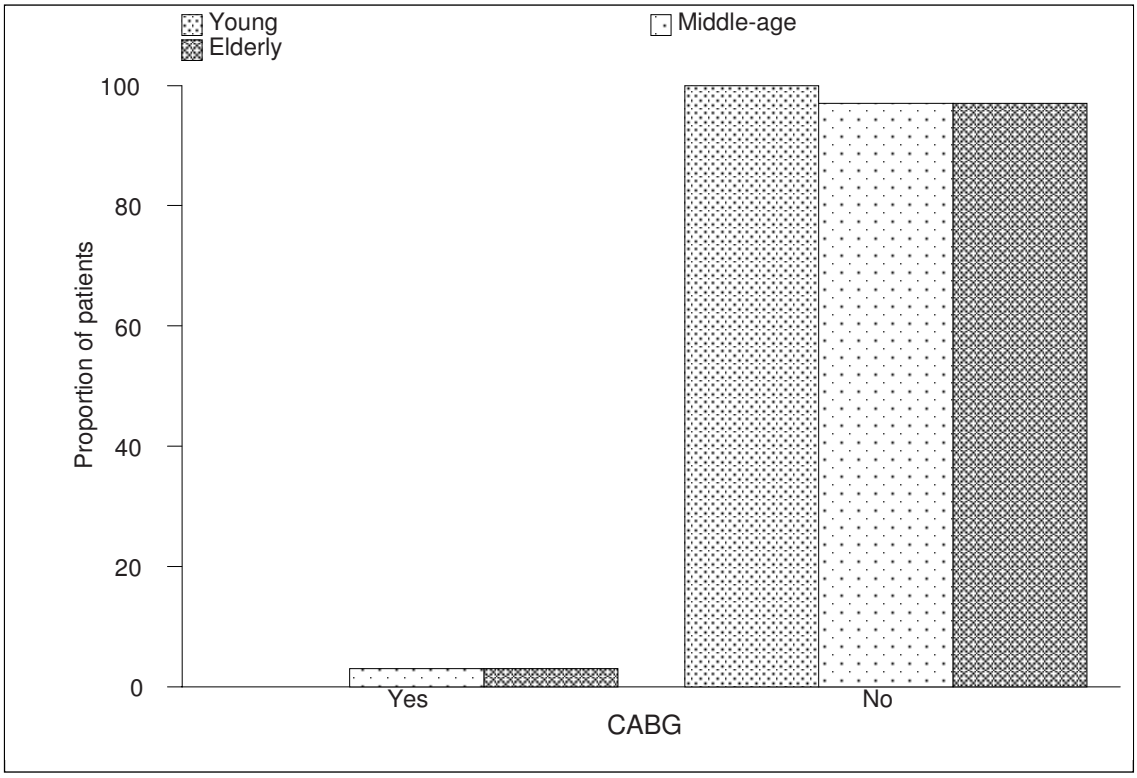


Table 4.3.2 Treatments for patients with NSTEMI/UA by gender, Malaysia 2006

| | **Male N=1339** | **Female N=638** |
|---|---|---|
| Total admission day* | | |
| • N | 1315 | 619 |
| • Mean, SD | 6 (4) | 6 (4) |
| • Median, (min, max) | 4 (1,29) | 5 (1,30) |
| | | |
| Number of days on CCU | | |
| • N | 425 | 165 |
| • Mean, SD | 3 (3) | 4 (3) |
| • Median, (min, max) | 3 (1,24) | 3 (1,19) |
| | | |
| Number of days on ICU/CICU | | |
| • N | 96 | 41 |
| • Mean, SD | 3 (2) | 5 (4) |
| • Median, (min, max) | 3 (1,11) | 4 (1,23) |
| | | |
| Cardiac catheterization, no. % | | |
| • Yes | 264 (20) | 93 (15) |
| • No | 1056 (79) | 529 (83) |
| • No-Transferred to another centre | 19 (1) | 16 (3) |
| | | |
| Percutaneous coronary intervention, no. % | | |
| • Yes | 182 (14) | 60 (9) |
| • No | 1157 (86) | 578 (91) |
| | | |
| CABG, no. % | | |
| • Yes | 42 (3) | 15 (2) |
| • No | 1297 (97) | 623 (98) |
| | | |
| Pre-admission aspirin use | | |
| • Yes | 570 (43) | 267 (42) |
| • No | 471 (35) | 254 (40) |
| • Unknown | 298 (22) | 117 (18) |
| | | |

| | Male N=1339 | Female N=638 |
|---|---|---|
| Pharmacological therapy given during admission, no. % | | |
| • ASA | 1224 (91) | 559 (88) |
| • ADP antagonist | 813 (61) | 328 (51) |
| • GP receptor inhibitor | 50 (4) | 16 (3) |
| • Unfractionated heparin | 283 (21) | 117 (18) |
| • LMWH | 878 (66) | 426 (67) |
| • Beta blocker | 902 (67) | 422 (66) |
| • ACE inhibitor | 772 (58) | 335 (53) |
| • Angiotensin II receptor blocker | 119 (9) | 82 (13) |
| • Statin | 1225 (91) | 566 (89) |
| • Other lipid lowering agent | 82 (6) | 51 (8) |
| • Diuretics | 453 (34) | 252 (39) |
| • Calcium antagonist | 263 (20) | 185 (29) |
| • Oral hypoglycaemic agent | 381 (28) | 219 (34) |
| • Insulin | 319 (24) | 184 (29) |
| • Anti-arrhythmic agent | 85 (6) | 36 (6) |

**Total admission days is derived as Outcome date – Admission date + 1*
*Note: Percentage is to the nearest decimal point.*

Figure 4.3.2a Cardiac catheterization for patients with NSTEMI/UA by gender, Malaysia 2006

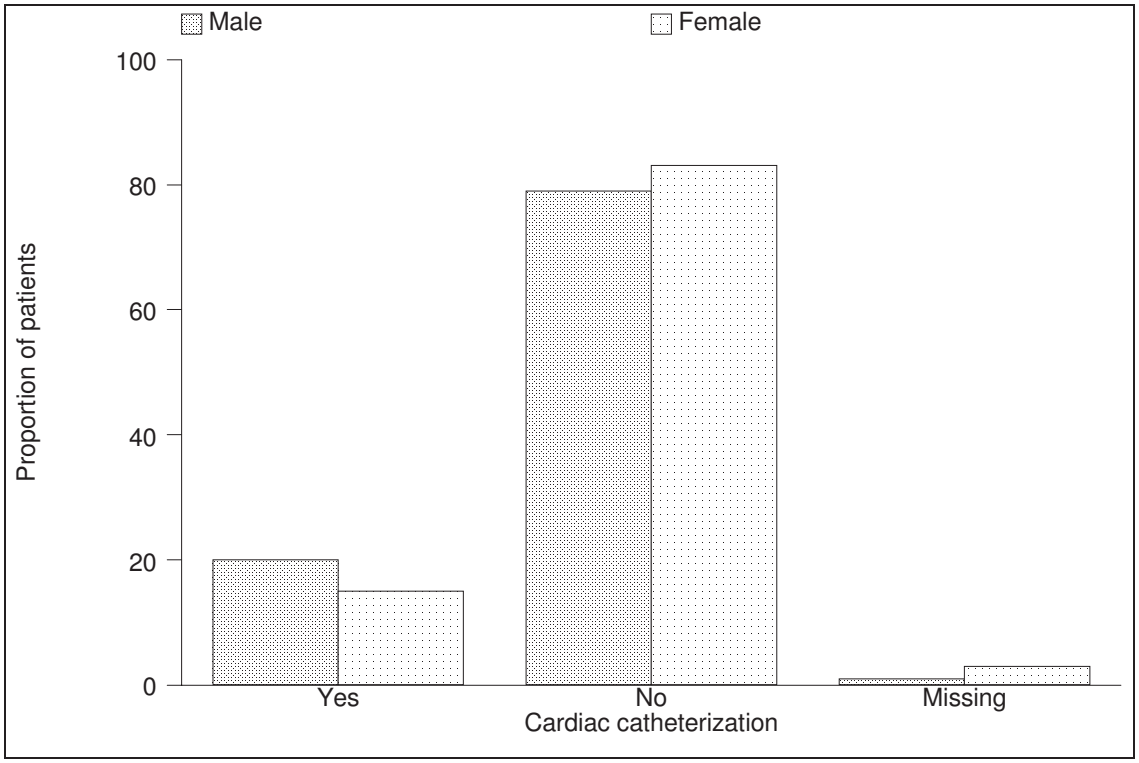


Figure 4.3.2b Percutaneous coronary intervention for patients with NSTEMI/UA by gender, Malaysia 2006

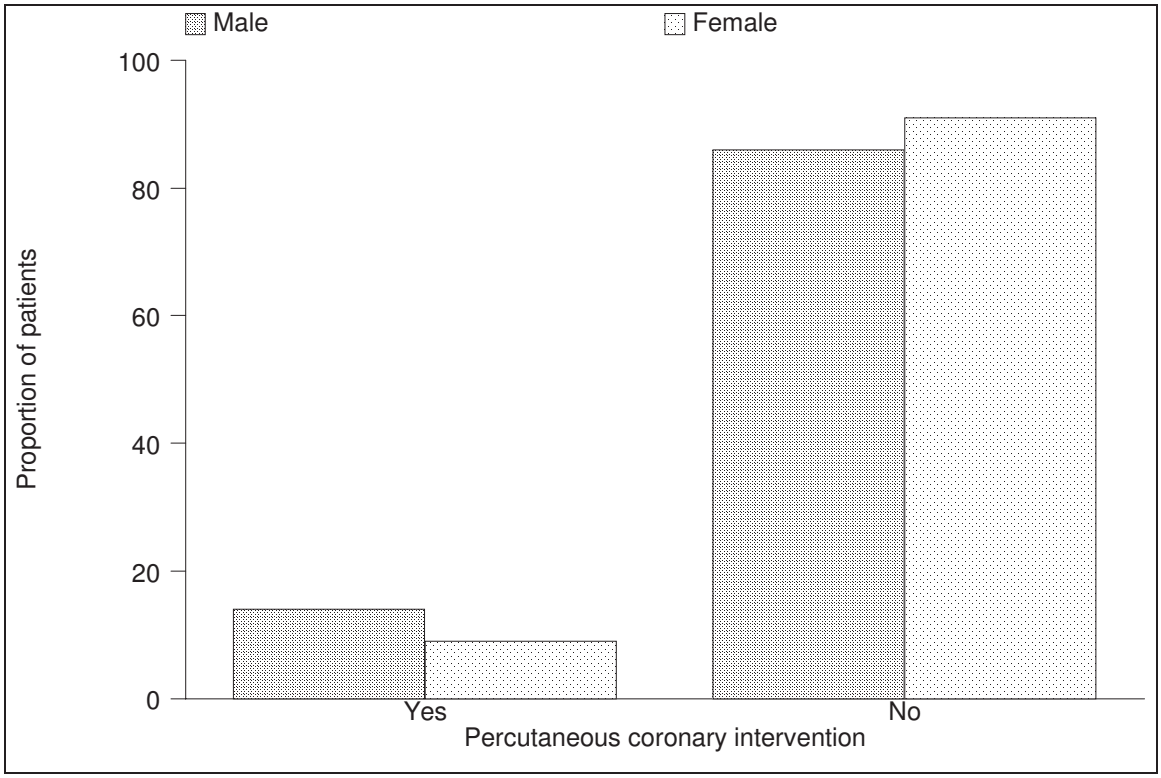



Figure 4.3.2c CABG for patients with NSTEMI/UA by gender, Malaysia 2006

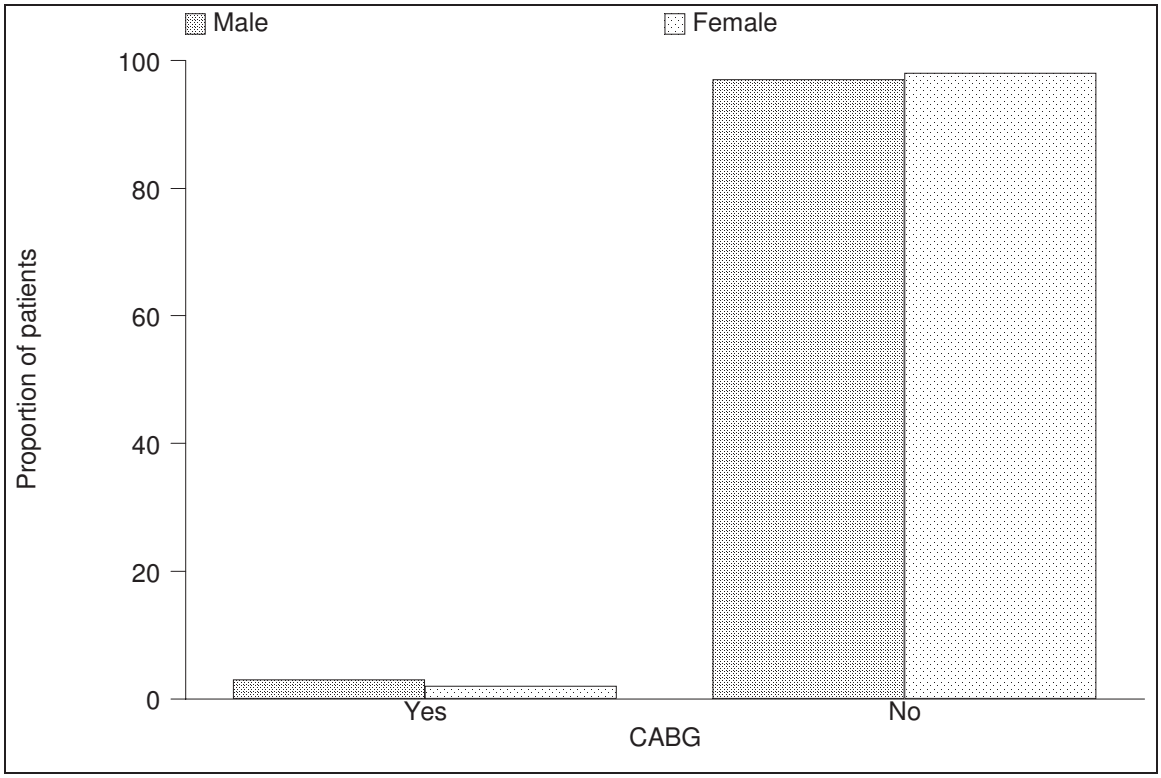


Table 4.3.3 Treatments for patients with NSTEMI/UA by ethnic group, Malaysia 2006

| | **Malay N=904** | **Chinese N=485** | **Indian N=513** | **Others* N=75** |
|---|---|---|---|---|
| Total admission days** | | | | |
| • N | 879 | 477 | 506 | 72 |
| • Mean, SD | 6 (4) | 6 (4) | 6 (4) | 5 (3) |
| • Median, (min, max) | 5 (1,26) | 4 (1,30) | 5 (1,30) | 4 (2,18) |
| | | | | |
| Number of days on CCU | | | | |
| • N | 278 | 156 | 115 | 41 |
| • Mean, SD | 4 (3) | 3 (2) | 4 (3) | 3 (2) |
| • Median, (min, max) | 3 (1,24) | 2 (1,17) | 3 (1,14) | 3 (1,9) |
| | | | | |
| Number of days on ICU/CICU | | | | |
| • N | 59 | 43 | 17 | 18 |
| • Mean, SD | 4 (3) | 3 (3) | 4 (3) | 3 (3) |
| • Median, (min, max) | 3 (1,23) | 3 (1,11) | 3 (1,12) | 2 (1,10) |
| | | | | |
| Cardiac catheterization, no. % | | | | |
| • Yes | 156 (17) | 83 (17) | 103 (20) | 15 (20) |
| • No | 731 (81) | 392 (81) | 402 (78) | 60 (80) |
| • No-Transferred to another centre | 17 (2) | 10 (2) | 8 (2) | 0 (0) |
| | | | | |
| Percutaneous coronary intervention, no. % | | | | |
| • Yes | 100 (11) | 62 (13) | 70 (14) | 10 (13) |
| • No | 804 (89) | 423 (87) | 443 (86) | 65 (87) |
| | | | | |
| CABG, no. % | | | | |
| • Yes | 29 (3) | 16 (3) | 11 (2) | 1 (1) |
| • No | 875 (97) | 469 (97) | 502 (98) | 74 (99) |
| | | | | |
| Pre-admission aspirin use | | | | |
| • Yes | 401 (44) | 183 (38) | 233 (45) | 20 (27) |
| • No | 335 (37) | 194 (40) | 155 (30) | 41 (55) |
| • Unknown | 168 (19) | 108 (22) | 125 (24) | 14 (19) |
| | | | | |

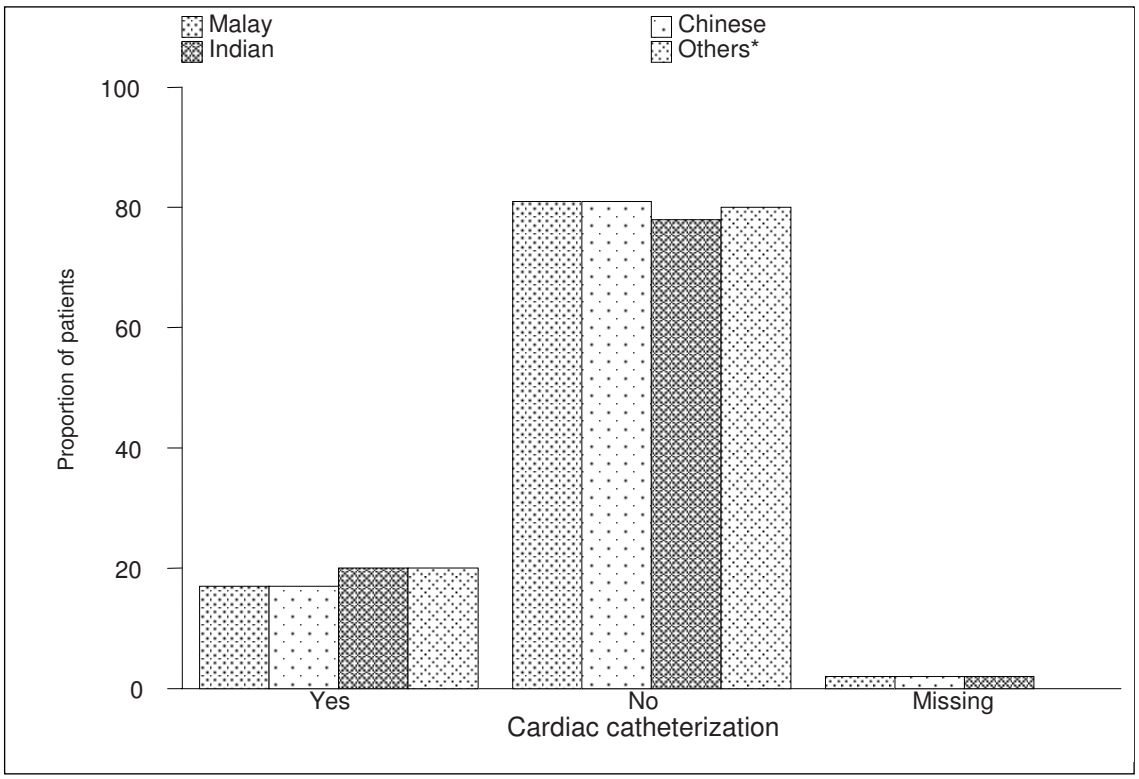
| | Malay N=904 | Chinese N=485 | Indian N=513 | Others* N=75 |
|---|---|---|---|---|
| Pharmacological therapy given during admission, no. % | | | | |
| • ASA | 814 (90) | 440 (91) | 462 (90) | 67 (89) |
| • ADP antagonist | 461 (51) | 299 (62) | 335 (65) | 46 (61) |
| • GP receptor inhibitor | 27 (3) | 20 (4) | 15 (3) | 4 (5) |
| • Unfractionated heparin | 284 (31) | 47 (10) | 64 (12) | 5 (7) |
| • LMWH | 495 (55) | 369 (76) | 390 (76) | 50 (67) |
| • Beta blocker | 575 (64) | 353 (73) | 350 (68) | 46 (61) |
| • ACE inhibitor | 510 (56) | 259 (53) | 303 (59) | 35 (47) |
| • Angiotensin II receptor blocker | 82 (9) | 49 (10) | 63 (12) | 7 (9) |
| • Statin | 798 (88) | 443 (91) | 480 (94) | 70 (93) |
| • Other lipid lowering agent | 55 (6) | 40 (8) | 34 (7) | 4 (5) |
| • Diuretics | 330 (37) | 172 (35) | 181 (35) | 22 (29) |
| • Calcium antagonist | 190 (21) | 104 (21) | 135 (26) | 19 (25) |
| • Oral hypoglycaemic agent | 227 (25) | 140 (29) | 218 (42) | 15 (20) |
| • Insulin | 195 (22) | 107 (22) | 188 (37) | 13 (17) |
| • Anti-arrhythmic agent | 60 (7) | 34 (7) | 22 (4) | 5 (7) |

** Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

*** Total admission days is derived as Outcome date – Admission date + 1*

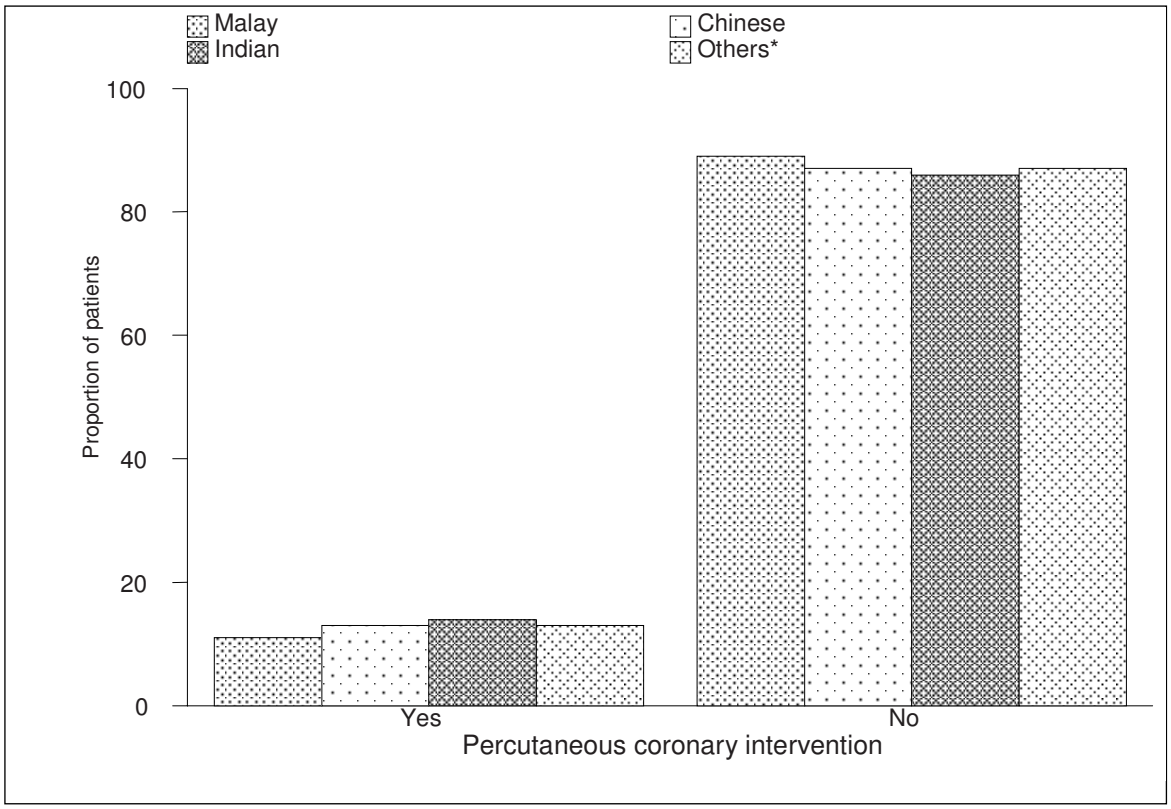
*Note: Percentage is to the nearest decimal point.*

Figure 4.3.3a Cardiac catheterization for patients with NSTEMI/UA by ethnic group, Malaysia 2006



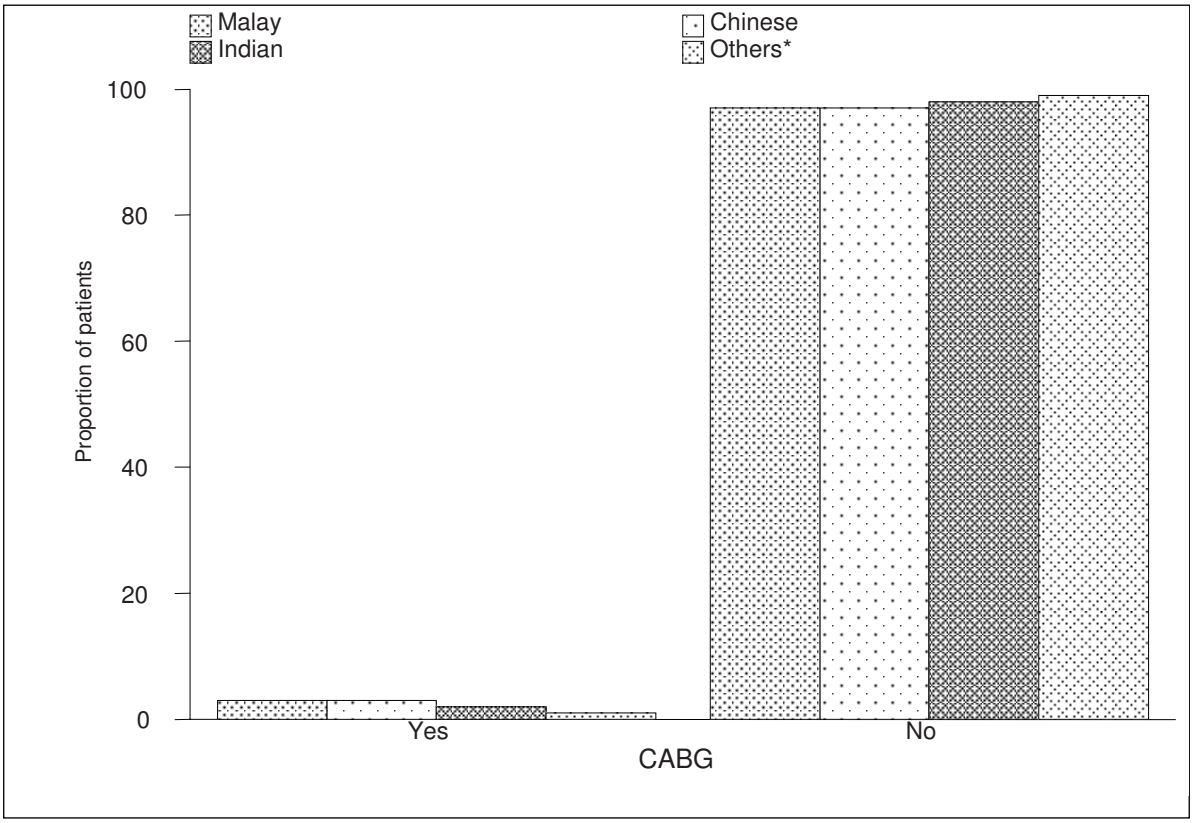

** Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

Figure 4.3.3b Pecutaneous coronary intervention for patients with NSTEMI/UA by ethnic group, Malaysia 2006




** Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

Figure 4.3.3c CABG for patients with NSTEMI/UA by ethnic group, Malaysia 2006




** Others includes Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner*

# CHAPTER 5

# OUTCOMES

**Chong Wei Peng**

**Wan Azman Wan Ahmad**

**In-hospital and 30-day outcome (Table 5.1 & 5.3)**

The in-hospital mortality for the entire cohort of patients was 7% (229 deaths) while 30-day mortality was 8% (288 deaths) (Table 5.1). Based on the ACS stratum, the in-hospital death rates for patients with STEMI, NSTEMI and UA were 9%, 7% and 3% respectively. At 30 days, the death rates were 11%, 8% and 4% respectively (Table 5.3). As nearly a quarter of the patients were lost to follow-up, the 30-day mortalities were likely to be underestimated.

Similar patterns of mortality – highest in STEMI, followed by NSTEMI and lowest in UA, were observed in other prospective surveys of ACS [2, 3, 5].

The mortality rates in the current survey were similar to other registries in the late 90s. In GRACE study[5], the in-hospital death rates for STEMI, NSTEMI and UA were 7%, 6% and 3% respectively. The National Registry of Myocardial Infarction (NRMI) 3 reported a 9% in-hospital death rate for STEMI[4]. But more recent data from the western countries showed a significant reduction in ACS mortality. In-hospital death rates for STEMI and NSTEMI ACS were 4.6% and 2.2% respectively in GRACE study[2] in year 2005, and 5.3% and 2.5% respectively in the second Euro Heart Survey for ACS[3] in 2004.

**Outcome by pre-specified variables (Table 5.2.1 to 5.2.5)**

The highest in-hospital and 30-day mortality, 10% and 13% respectively were observed in the elderly age group (Table 5.2.1). The mortalities in the young and middle-age groups were similar. Female patients experienced higher in-hospital and 30-day mortality (8% and 10% respectively) compared to the male patients (6% and 8%) (Table 5.2.2). Patients with pre-morbid diabetes mellitus also had a higher in-hospital and 30-day mortality (7% and 10% respectively) than those without diabetes mellitus (5% and 6%) (Table 5.2.3). The mortality in patients with pre-morbid hypertension was similar to those without hypertension (6% in-hospital and 8% 30-day mortality vs. 7% and 8% respectively) (Table 5.2.4). Interestingly, pre-morbid dyslipidaemia was associated with lower in-hospital and 30-day mortality rates (5% and 6% respectively) compared to those without dyslipidaemia (7% and 9%) (Table 5.2.5).

**Outcome of STEMI by treatment (Table 5.4.1 to 5.4.4)**

In STEMI, the use of fibrinolysis was associated with lower in-hospital and 30-day mortality rates (7% and 9% respectively vs. 13% and 16%) (Table 5.4.1). On the other hand, mortality of patients who had PCI was similar to those who did not have PCI (Table 5.4.2). PCI was performed in 21% of patients as primary PCI, rescue PCI or PCI for post-infarct angina. Therefore these data do not compare primary PCI with fibrinolysis in STEMI. Only 10 patients had CABG during the admission for STEMI, and all 10 were alive upon discharge and at 30 days (Table 5.4.3).

**Outcome of NSTEMI/UA by treatment (Table 5.5.1 to 5.5.3)**

In NSTEMI and UA, only 12.3% of the patients in this survey had in-hospital PCI, compared to 37.1% reported in the second Euro Heart Survey on ACS[3], and 28% (in NSTEMI) and 18% (in UA) in GRACE[1]. The in-hospital and 30-day mortalities of patients who had PCI were slightly lower compared to those medically treated (4% vs. 5% and 5% vs. 7% respectively) (Table 5.5.1). In contrast to STEMI, more NSTEMI/UA patients (n=57) underwent CABG during hospitalization for the index event. Both in-hospital and 30-day mortalities were higher in this group of patients (14% for both) compared to those who did not have CABG (5% and 6% respectively) (Table 5.5.2).

**Prognostic factors (Table 5.6.1 to 5.6.4)**

The following were associated with an increased risk of in-hospital death in patients with STEMI: higher Killip class, higher TIMI risk score, former or current cigarette smoking, family history of premature cardiovascular disease, dyslipidaemia, hypertension and diabetes mellitus. Older age was associated with increased risk of in-hospital death. Prognostic factors for an increased death in 30 days among STEMI patients were almost similar with in-hospital death with the exception of dyslipidemia. In NSTEMI/UA, the following predicts higher in-hospital mortality: higher Killip class, former or current cigarette smoking, diabetes mellitus and heart failure. Older age is again associated with increased risk of death. For 30-day mortality, higher Killip class, cigarette smoking and diabetes mellitus were poor prognostic factors.

**Summary Points:**

- Total in hospital mortality for patients with ACS was 7% while 30-day mortality was 8%.
- The mortality was higher in STEMI followed by NSTEMI and lowest in UA. Our mortality rates were similar to other Western registries in the late 90s.
- In STEMI, the use of fibrinolysis was associated with lower in-hospital and 30-day mortality rates. In contrast there was no difference in outcome between those who underwent PCI on the same admission and those who did not.
- For STEMI and UA the in-hospital and 30-day mortalities of patients who had PCI were slightly lower compared to medically treated patients.
- Important prognostic factors for STEMI were higher Killip class, higher TIMI risk score and the presence of conventional risk factors. Higher Killip class was also an important prognostic factor for NSTEMI/UA.

**References:**

1. Fox KAA, Goodman SG, Klein W et al., GRACE investigators. Management of acute coronary syndromes. Variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). *Eur Heart J.* 2002; 23:1177-1189.

2. Fox KAA, Steg PG, Eagle KA et al., GRACE investigators. Decline in rates of death and acute coronary syndromes, 1999-2006. *JAMA* 2007; 297:1892-1900.

3. Mandelzweig L et al., Euro Heart Survey Investigators. The second Euro Heart Survey on acute coronary syndromes: characteristics, treatment, and outcome of patients with ACS in Europe and the Mediterranean Basin in 2004. *Eur Heart J.* 2006; 27,2285-93.

4. Rogers WJ, Canto JG, Lambrew CT et al. Temporal trends in the treatment of over 1.5 million patients with myocardial infarction in the US from 1990 through 1999: the National Registry of Myocardial Infarction 1, 2 and 3. J Am Coll Cardiol 2000; 36: 2056-63.

5. Steg PG, Goldberg RJ, Gore JM et al., GRACE Investigators. Baseline characteristics, management practices, and in-hospital outcomes of patients hospitalized with acute coronary syndromes in the Global Registry of Acute Coronary Events (GRACE). *Am J Cardiol.* 2002; 90(4):358-63.

Table 5.1 Overall outcomes for patients with ACS, Malaysia 2006

| Outcome | Overall outcome | | | |
|---|---|---|---|---|
| | In-hospital | | 30-day* | |
| | No. | % | No. | % |
| • Discharged / Alive | 3186 | 93 | 2302 | 67 |
| • Died | 229 | 7 | 288 | 8 |
| • Lost to follow-up | NA | NA | 832 | 24 |
| • Missing | 7 | 0 | 0 | 0 |

**Including patients who died in-hospital*
*Note: Percentage is to the nearest decimal point.*

Figure 5.1.1 In-hospital outcomes for patients with ACS, Malaysia 2006

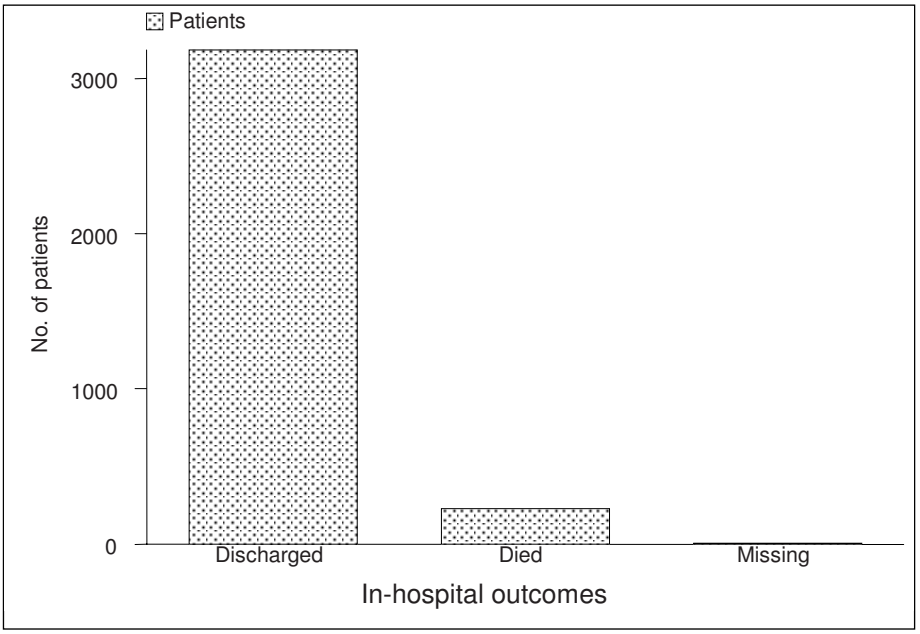


Figure 5.1.2 30-day outcomes for patients with ACS, Malaysia 2006

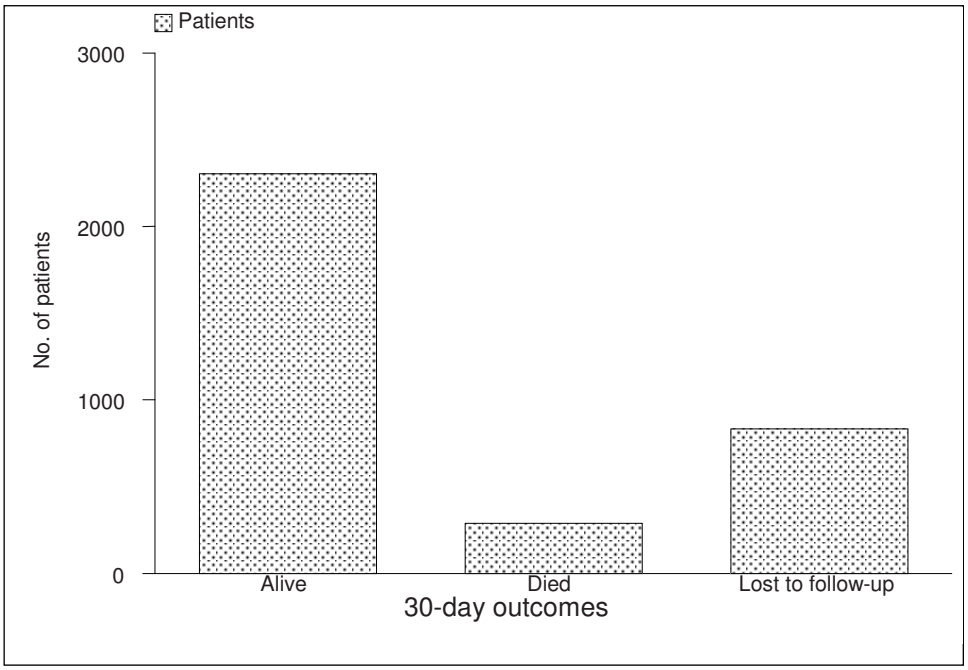



Table 5.2.1 Overall outcomes for patients with ACS by age group (years), Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Young | | Middle-age | | elderly | | Young | | Middle-age | | elderly | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 162 | 98 | 1610 | 96 | 1414 | 89 | 117 | 70 | 1139 | 68 | 1046 | 66 |
| • Died | 4 | 2 | 63 | 4 | 162 | 10 | 6 | 4 | 82 | 5 | 200 | 13 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 43 | 26 | 454 | 27 | 335 | 21 |
| • Missing | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Notes:*
*1. Young is defined as age from 20 to less than 40 years, middle-age is defined as age between 40 to less than 60 years and elderly is defined as 60 years and above.*
*2. Percentage is to the nearest decimal point.*

Figure 5.2.1a In-hospital outcomes for patients with ACS by age group (years), Malaysia 2006

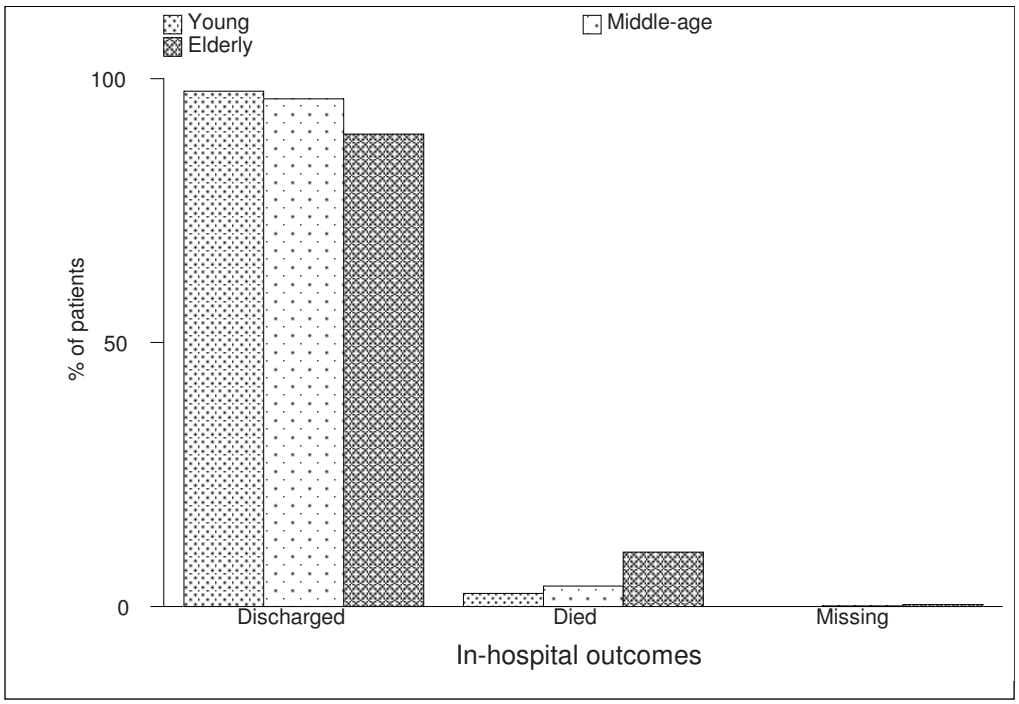



Figure 5.2.1b 30-day outcomes for patients with ACS by age group (years), Malaysia 2006

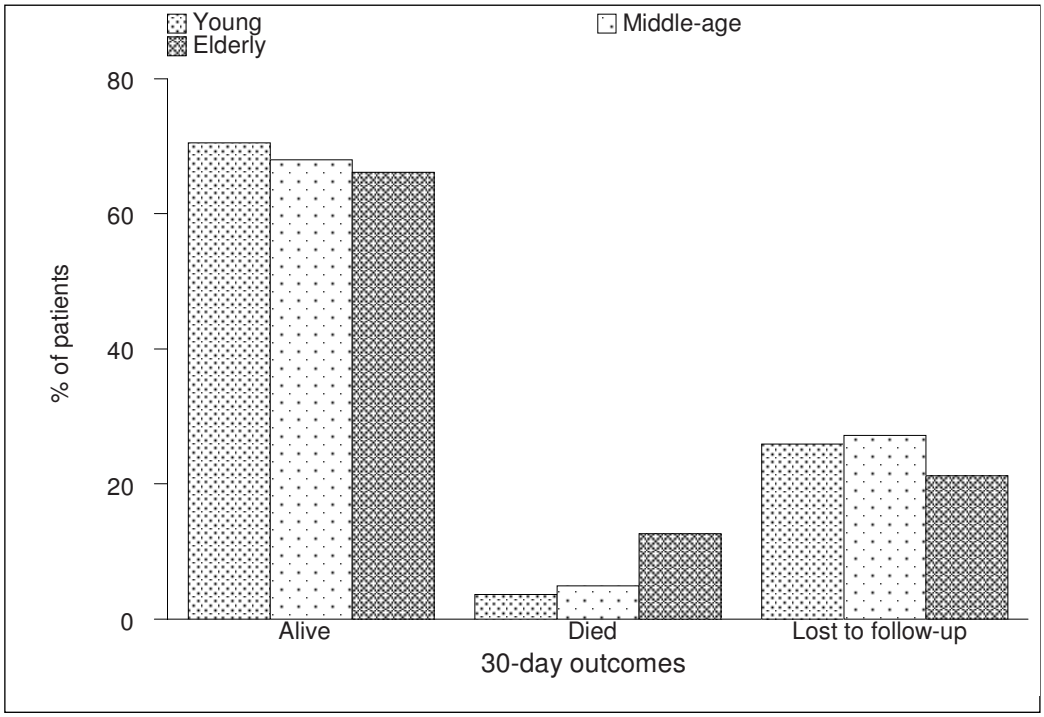


Table 5.2.2 Overall outcomes for patients with ACS by gender, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 2401 | 93 | 785 | 92 | 1752 | 68 | 550 | 64 |
| • Died | 164 | 6 | 65 | 8 | 203 | 8 | 85 | 10 |
| • Lost to follow-up | NA | NA | NA | NA | 614 | 24 | 218 | 26 |
| • Missing | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.2.2a In-hospital outcomes for patients with ACS by gender, Malaysia 2006

Figure 5.2.2b 30-day outcomes for patients with ACS by gender, Malaysia 2006


Table 5.2.3 Overall outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diabetic | | Non-diabetic | | Not known | | Diabetic | | Non-diabetic | | Not known | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 1388 | 93 | 1160 | 95 | 638 | 91 | 1010 | 67 | 817 | 67 | 475 | 68 |
| • Died | 108 | 7 | 64 | 5 | 57 | 8 | 143 | 10 | 78 | 6 | 67 | 10 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 344 | 23 | 331 | 27 | 157 | 22 |
| • Missing | 1 | 0 | 2 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.2.3a In-hospital outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006

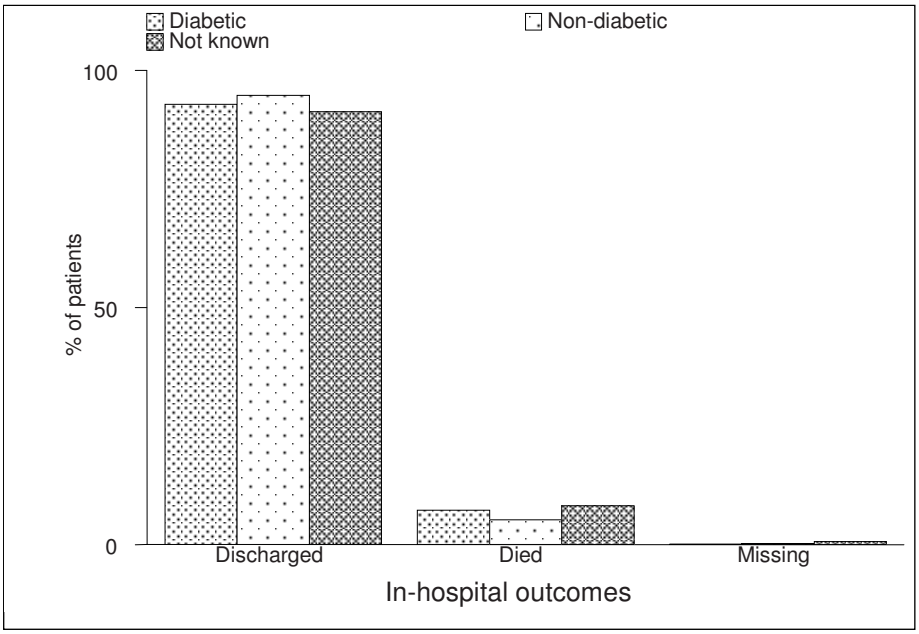



Figure 5.2.3b 30-day outcomes for patients with ACS by pre-morbid diabetes, Malaysia 2006

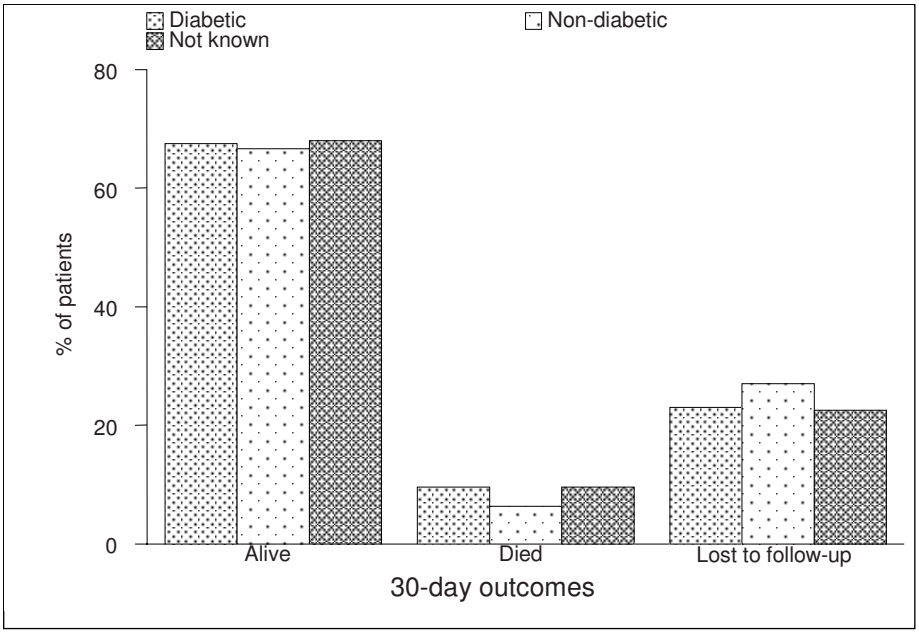


Table 5.2.4 Overall outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hypertensive | | Non-hypertensive | | Not known | | Hypertensive | | Non-hypertensive | | Not known | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 1947 | 93 | 733 | 93 | 506 | 92 | 1425 | 68 | 510 | 65 | 367 | 66 |
| • Died | 134 | 6 | 52 | 7 | 43 | 8 | 171 | 8 | 63 | 8 | 54 | 10 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 488 | 23 | 213 | 27 | 131 | 24 |
| • Missing | 3 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.2.4a In-hospital outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006

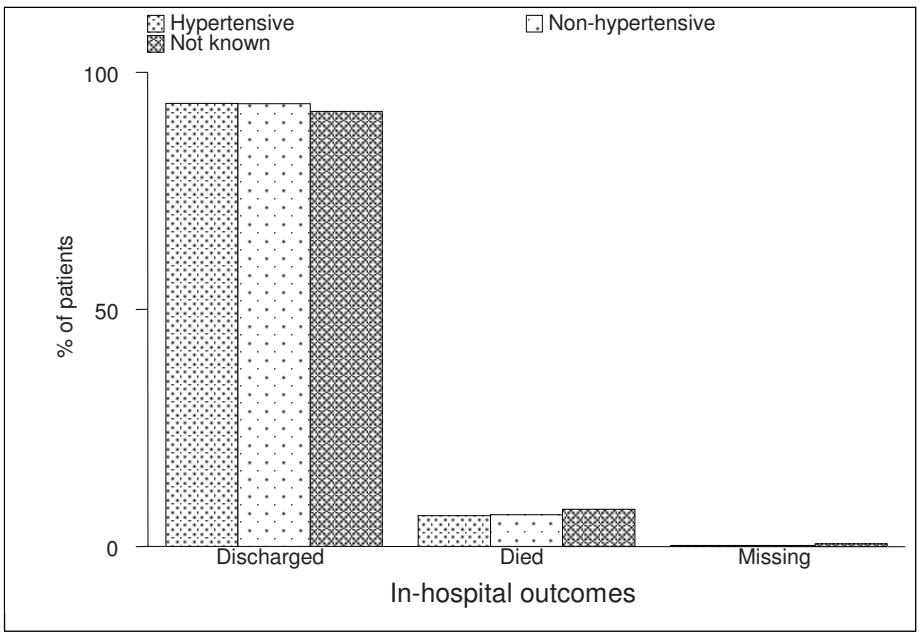


Figure 5.2.4b 30-day outcomes for patients with ACS by pre-morbid hypertension, Malaysia 2006

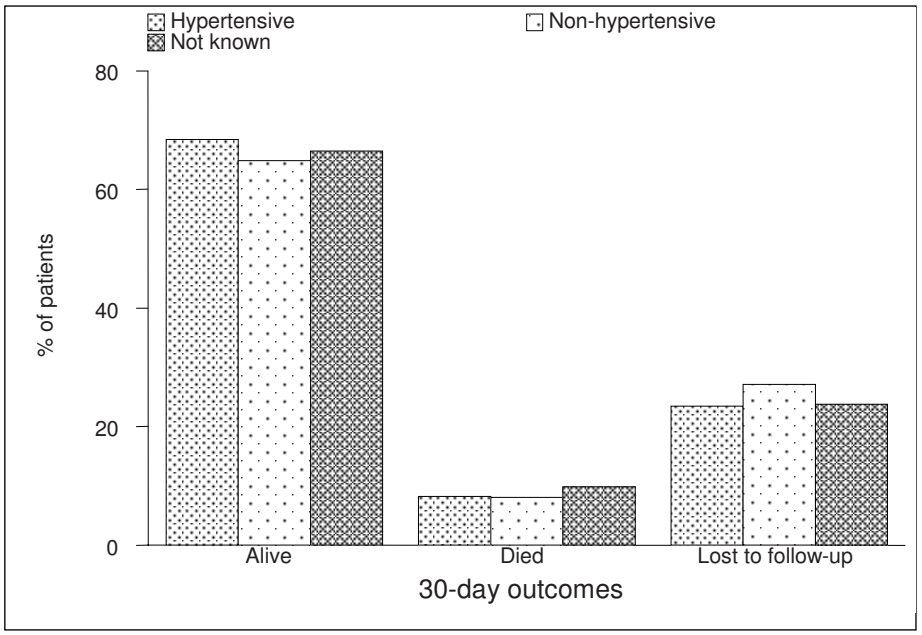



Table 5.2.5 Overall outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dyslipidaemia | | | | | | Dyslipidaemia | | | | | |
| | Yes | | No | | Not known | | Yes | | No | | Not known | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 1075 | 95 | 838 | 93 | 1273 | 92 | 843 | 75 | 546 | 61 | 913 | 66 |
| • Died | 55 | 5 | 63 | 7 | 111 | 8 | 70 | 6 | 82 | 9 | 136 | 10 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 218 | 19 | 274 | 30 | 340 | 24 |
| • Missing | 1 | 0 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.2.5a In-hospital outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

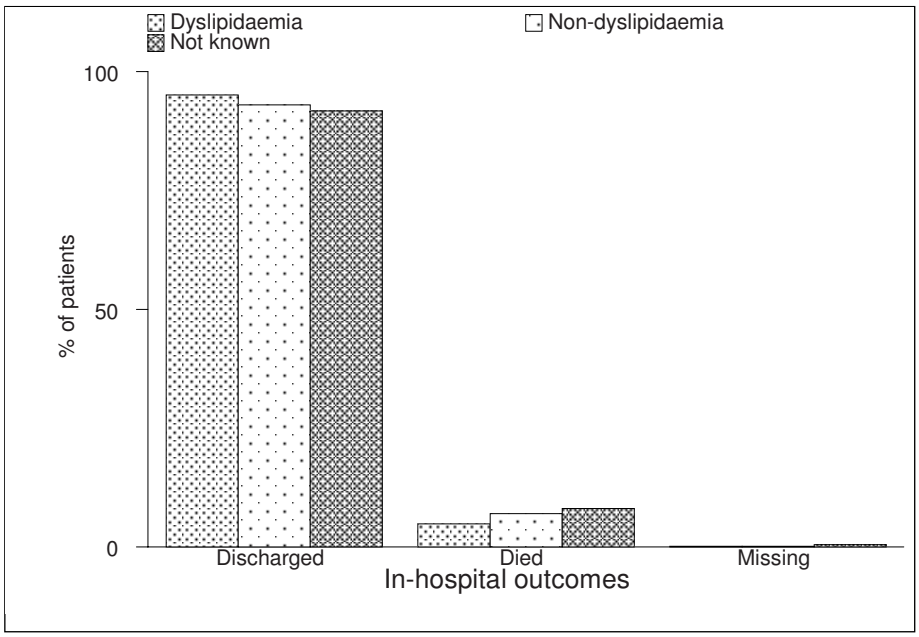



Figure 5.2.5b 30-day outcomes for patients with ACS by pre-morbid dyslipidaemia, Malaysia 2006

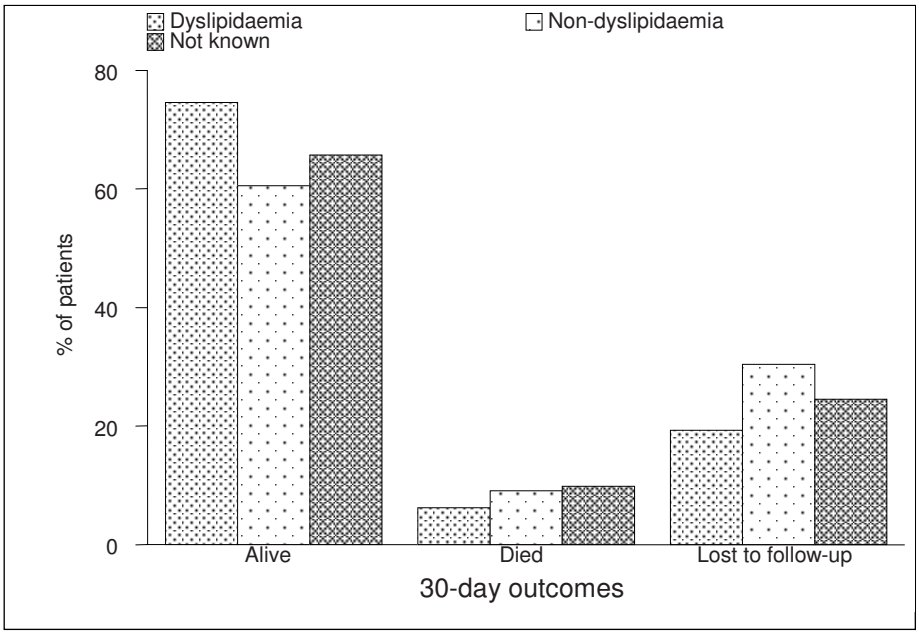


Table 5.3 Overall outcomes for patients with ACS by ACS stratum, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STEMI | | NSTEMI | | UA | | STEMI | | NSTEMI | | UA | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 1312 | 91 | 1056 | 93 | 818 | 97 | 939 | 65 | 796 | 70 | 567 | 67 |
| • Died | 129 | 9 | 75 | 7 | 25 | 3 | 158 | 11 | 92 | 8 | 38 | 4 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 348 | 24 | 244 | 22 | 240 | 28 |
| • Missing | 4 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.3.1 In-hospital outcomes for patients with ACS by ACS stratum, Malaysia 2006

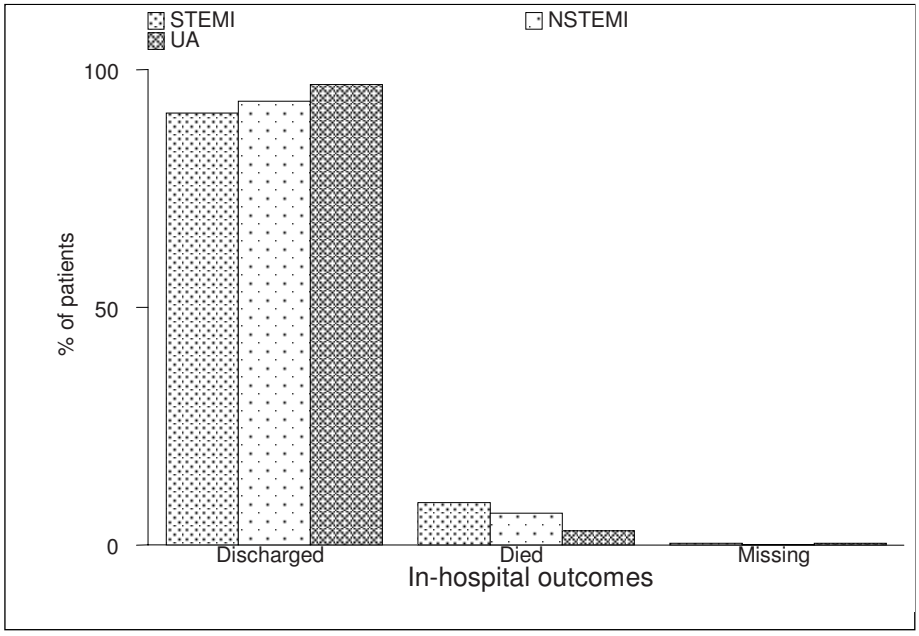


Figure 5.3.2 30-day outcomes for patients with ACS by ACS stratum, Malaysia 2006

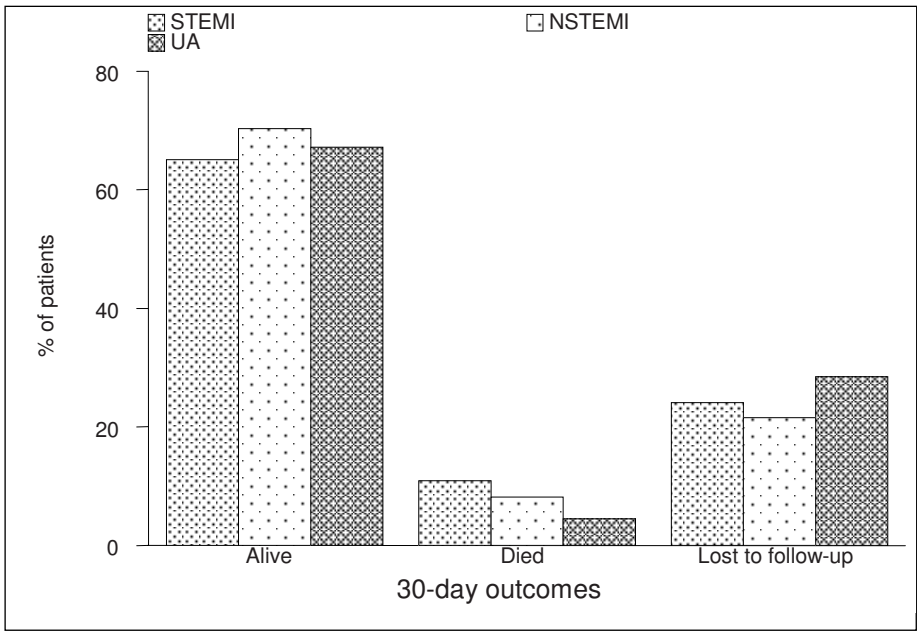



Table 5.4.1 Overall outcomes for patients with STEMI by fibrinolytic therapy, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | Fibrinolytic therapy | | | | Fibrinolytic therapy | | | |
| | Yes | | No | | Yes | | No | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 940 | 92 | 372 | 87 | 686 | 67 | 253 | 59 |
| • Died | 74 | 7 | 55 | 13 | 90 | 9 | 68 | 16 |
| • Lost to follow-up | NA | NA | NA | NA | 242 | 24 | 106 | 25 |
| • Missing | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Note: Percentage is to the nearest decimal point.*

Figure 5.4.1a In-hospital outcomes for patients with STEMI by fibronolytic therapy, Malaysia 2006

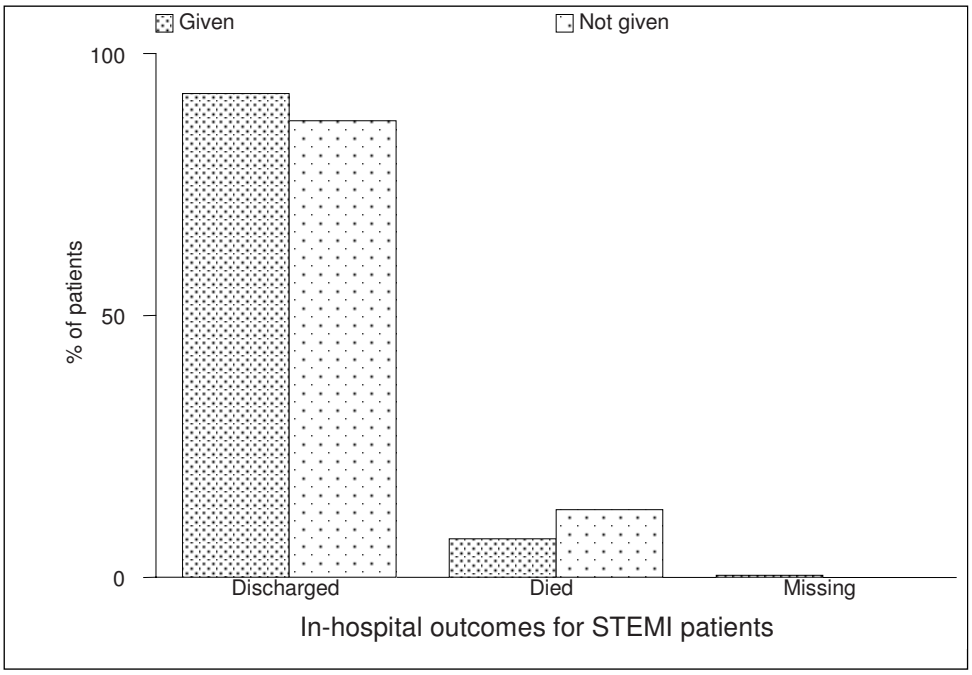



Figure 5.4.1b 30-day outcomes for patients with STEMI by fibronolytic therapy, Malaysia 2006

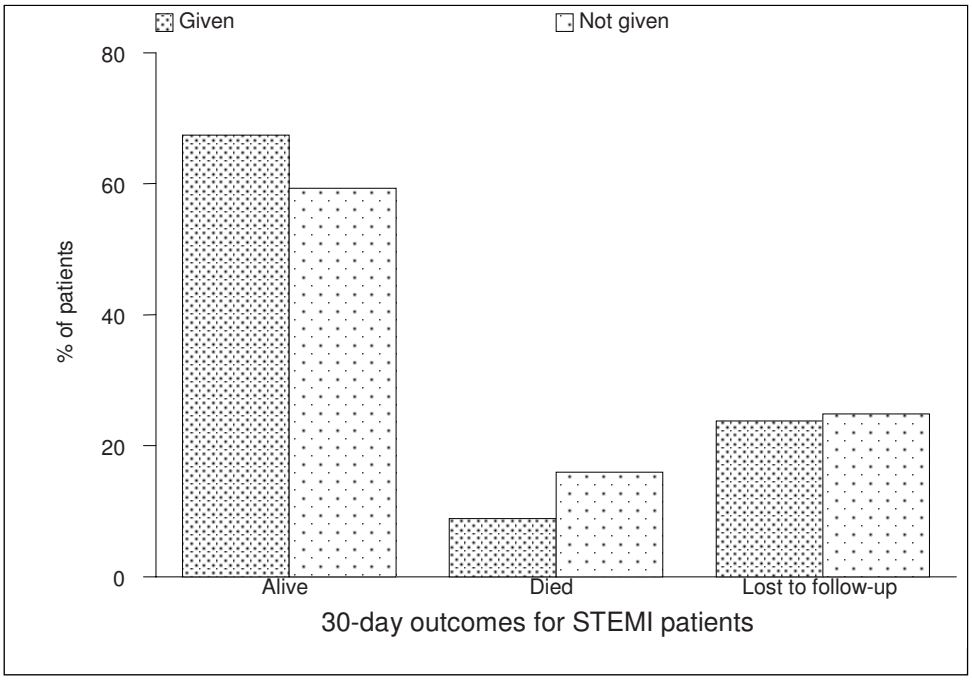


Table 5.4.2 Overall outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | Percutaneous coronary intervention | | | | Percutaneous coronary intervention | | | |
| | Yes | | No | | Yes | | No | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 283 | 92 | 1029 | 91 | 242 | 79 | 697 | 61 |
| • Died | 25 | 8 | 104 | 9 | 34 | 11 | 124 | 11 |
| • Lost to follow-up | NA | NA | NA | NA | 32 | 10 | 316 | 28 |
| • Missing | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*
*Notes:*
*1. Percentage is to the nearest decimal point.*
*2. Percutaneous Coronary Intervention includes primary, rescue and facilitated intervention*

Figure 5.4.2a In-hospital outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006

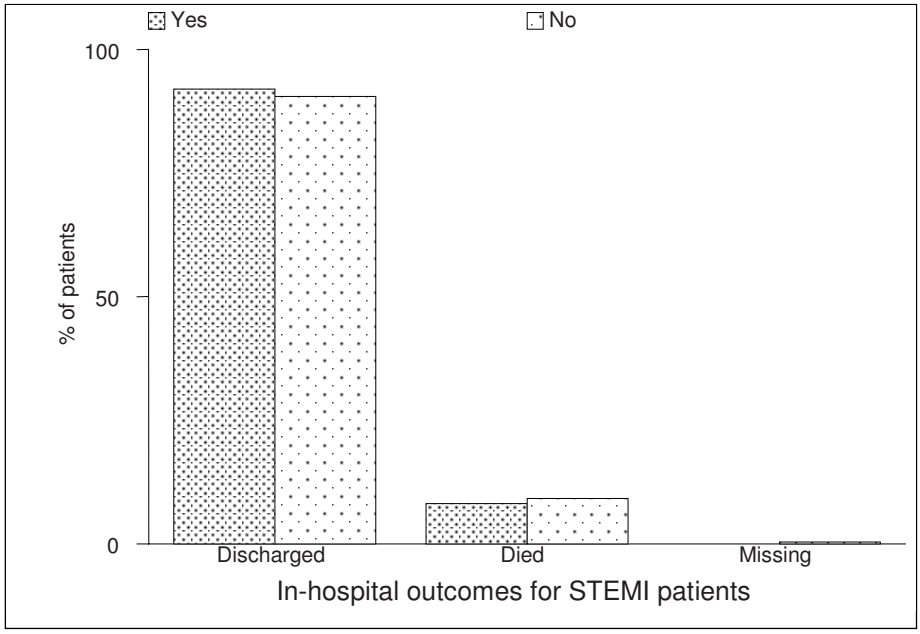


Figure 5.4.2b 30-day outcomes for patients with STEMI by percutaneous coronary intervention at admission, Malaysia 2006

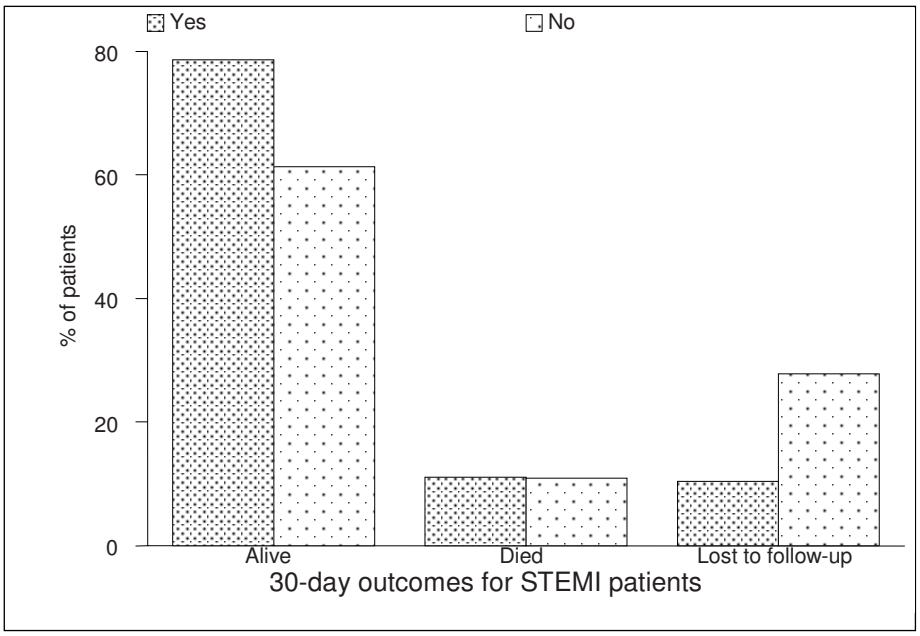



Table 5.4.3 Overall outcomes for patients with STEMI by CABG at admission, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | CABG | | | | CABG | | | |
| | Yes | | No | | Yes | | No | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 10 | 100 | 1302 | 91 | 10 | 100 | 929 | 65 |
| • Died | 0 | 0 | 129 | 9 | 0 | 0 | 158 | 11 |
| • Lost to follow-up | NA | NA | NA | NA | 0 | 0 | 348 | 24 |
| • Missing | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*

*Note: Percentage is to the nearest decimal point.*

Figure 5.4.3a In-hospital outcomes for patients with STEMI by CABG at admission, Malaysia 2006

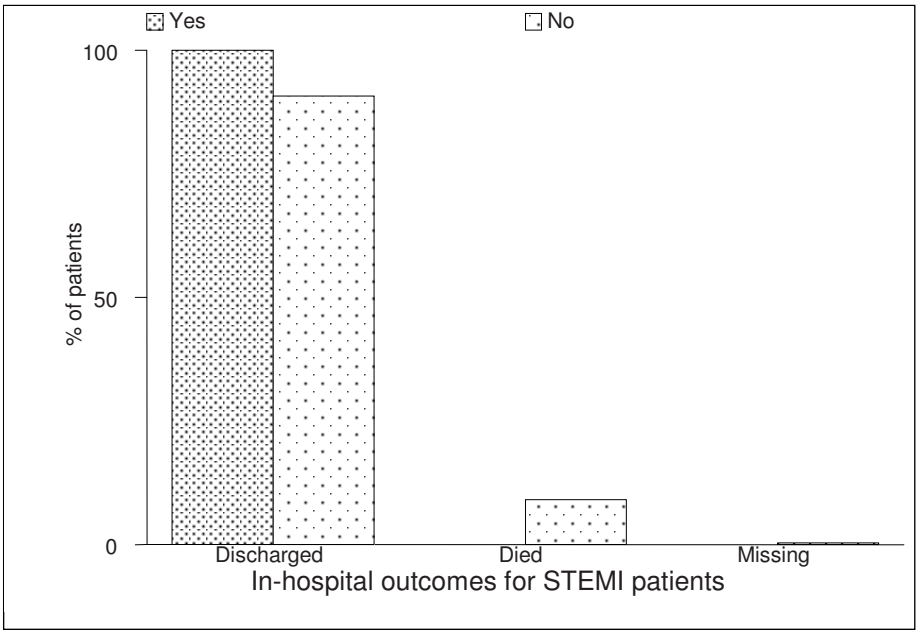



Figure 5.4.3b 30-day outcomes for patients with STEMI by CABG at admission, Malaysia 2006

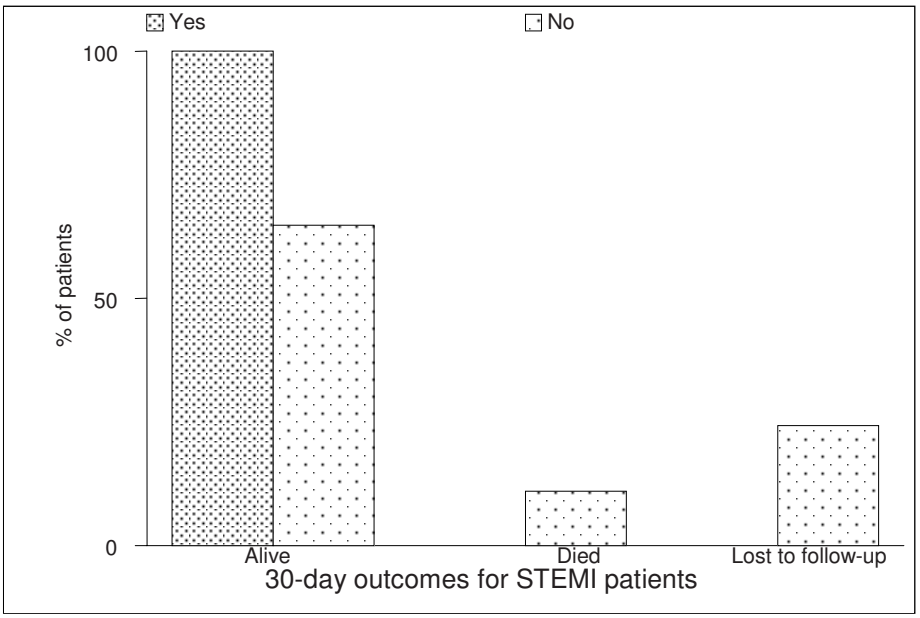


Table 5.4.4 Overall outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre-admission aspirin use | | | | | | Pre-admission aspirin use | | | | | |
| | Yes | | No | | Unknown | | Yes | | No | | Unknown | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 200 | 88 | 885 | 92 | 227 | 90 | 128 | 56 | 660 | 68 | 151 | 60 |
| • Died | 27 | 12 | 76 | 8 | 26 | 10 | 33 | 15 | 95 | 10 | 30 | 12 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 66 | 29 | 210 | 22 | 72 | 28 |
| • Missing | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*

*Note: Percentage is to the nearest decimal point.*

Figure 5.4.4a In-hospital outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006

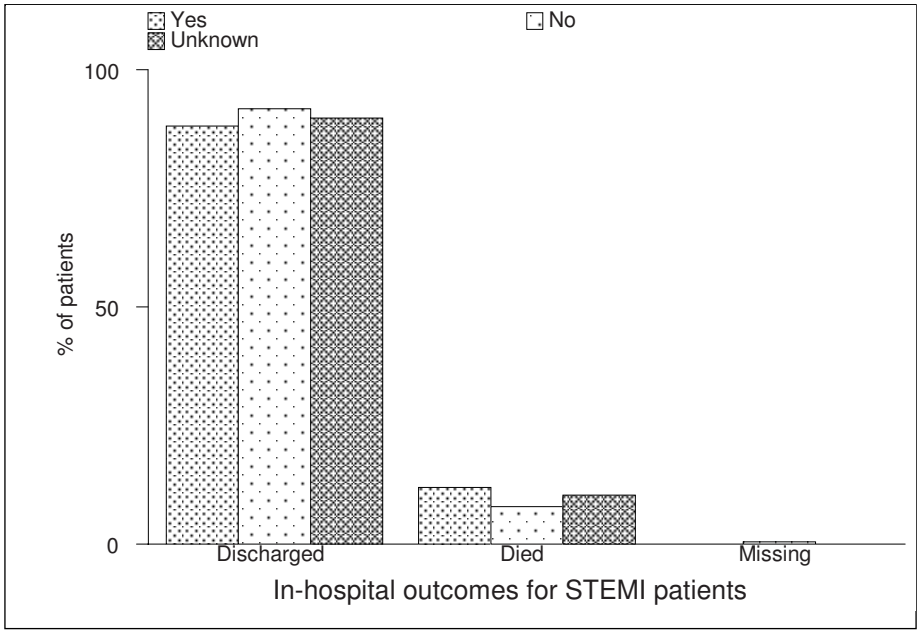


Figure 5.4.4b 30-day outcomes for patients with STEMI by pre-admission aspirin use, Malaysia 2006

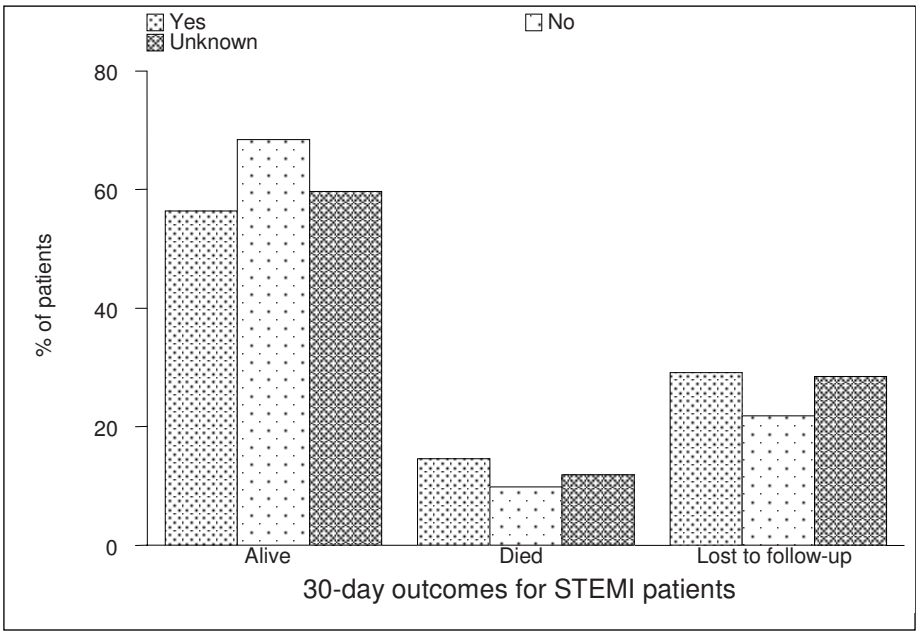



Table 5.5.1 Overall outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | Percutaneous coronary intervention | | | | Percutaneous coronary intervention | | | |
| | Yes | | No | | Yes | | No | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 233 | 96 | 1641 | 95 | 207 | 86 | 1156 | 67 |
| • Died | 9 | 4 | 91 | 5 | 12 | 5 | 118 | 7 |
| • Lost to follow-up | NA | NA | NA | NA | 23 | 10 | 461 | 27 |
| • Missing | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*

*Note: Percentage is to the nearest decimal point.*

Figure 5.5.1a In-hospital outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006

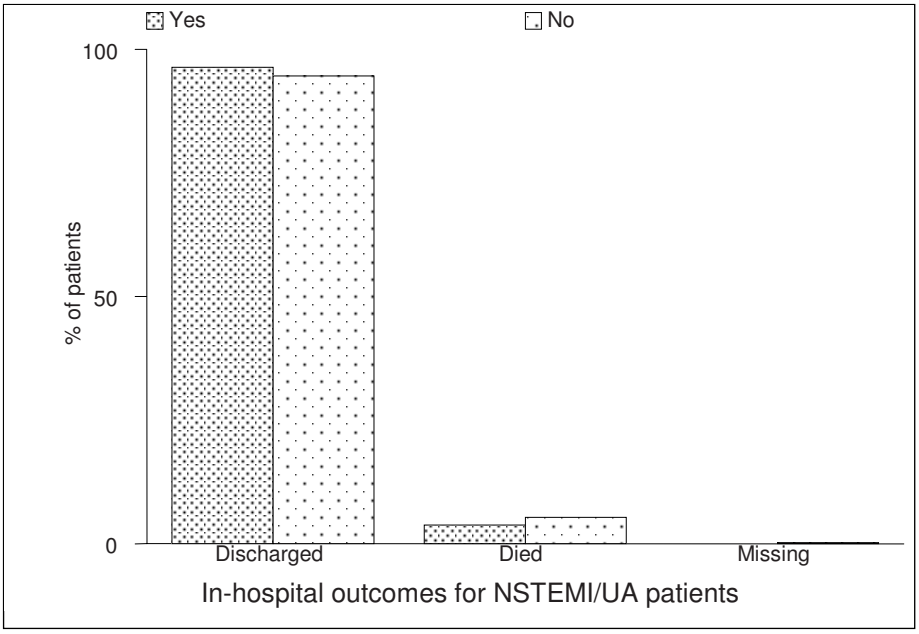



Figure 5.5.1b 30-day outcomes for patients with NSTEMI/UA by percutaneous coronary intervention, Malaysia 2006

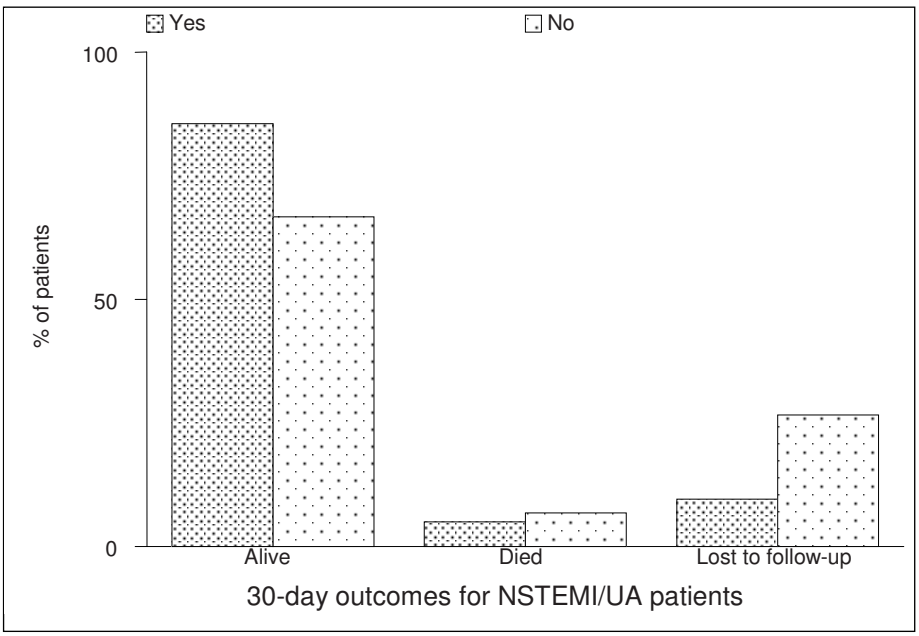


Table 5.5.2 Overall outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006

| Outcome | In-hospital | | | | 30-day* | | | |
|---|---|---|---|---|---|---|---|---|
| | CABG | | | | CABG | | | |
| | Yes | | No | | Yes | | No | |
| | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 49 | 86 | 1825 | 95 | 47 | 82 | 1316 | 69 |
| • Died | 8 | 14 | 92 | 5 | 8 | 14 | 122 | 6 |
| • Lost to follow-up | NA | NA | NA | NA | 2 | 4 | 482 | 25 |
| • Missing | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*

*Note: Percentage is to the nearest decimal point.*

Figure 5.5.2a In-hospital outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006

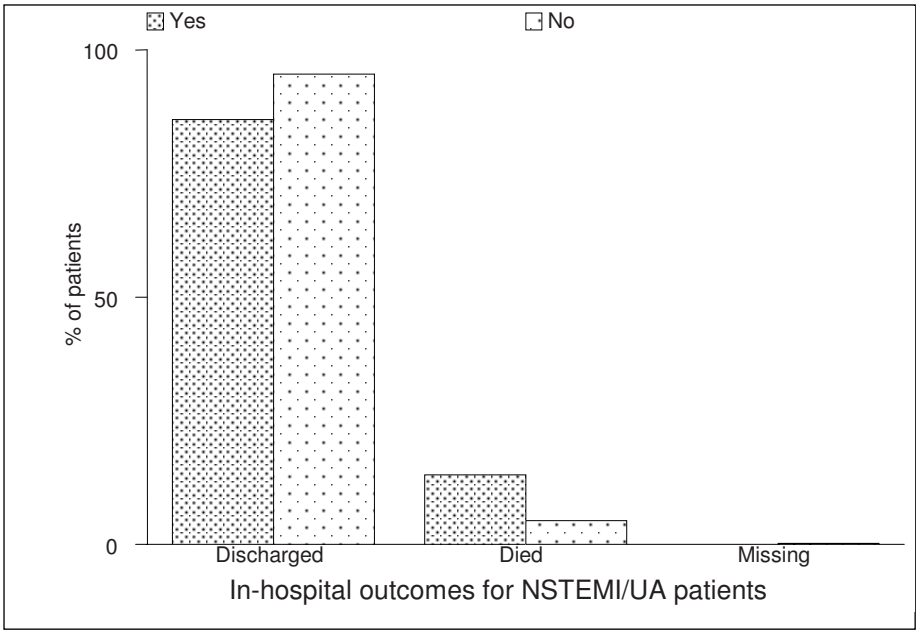


Figure 5.5.2b 30-day outcomes for patients with NSTEMI/UA by CABG, Malaysia 2006

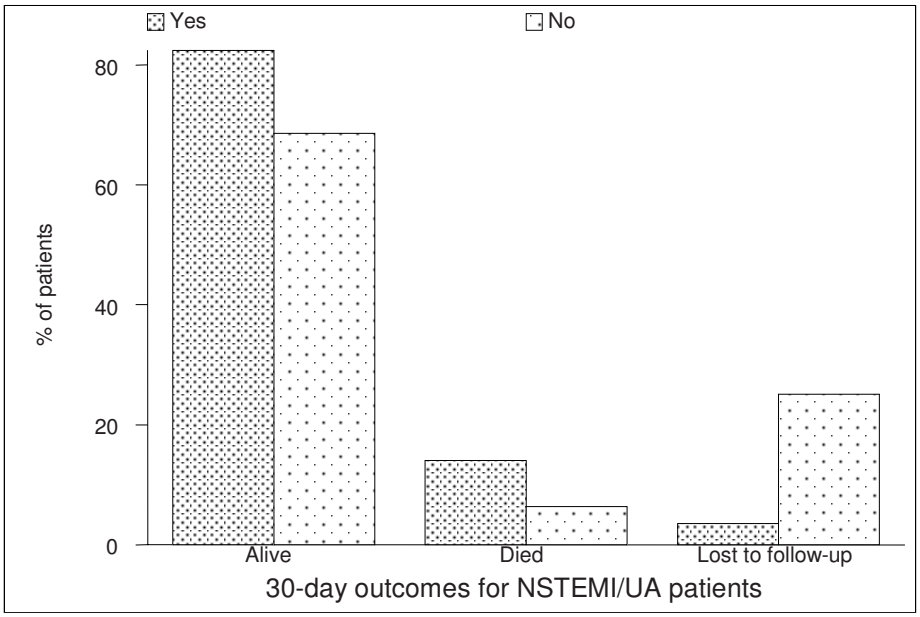



Table 5.5.3 Overall outcomes for patients with NSTEMI by pre-admission aspirin use, Malaysia 2006

| Outcome | In-hospital | | | | | | 30-day* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre-admission aspirin use | | | | | | Pre-admission aspirin use | | | | | |
| | Yes | | No | | Unknown | | Yes | | No | | Unknown | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| • Discharged / Alive | 796 | 95 | 688 | 95 | 390 | 94 | 582 | 70 | 501 | 69 | 280 | 67 |
| • Died | 41 | 5 | 34 | 5 | 25 | 6 | 56 | 7 | 44 | 6 | 30 | 7 |
| • Lost to follow-up | NA | NA | NA | NA | NA | NA | 199 | 24 | 180 | 25 | 105 | 25 |
| • Missing | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Including patients who died in-hospital.*

*Note: Percentage is to the nearest decimal point.*

Figure 5.5.3a In-hospital outcomes for patients with NSTEMI/UA by pre-admission aspirin use, Malaysia 2006

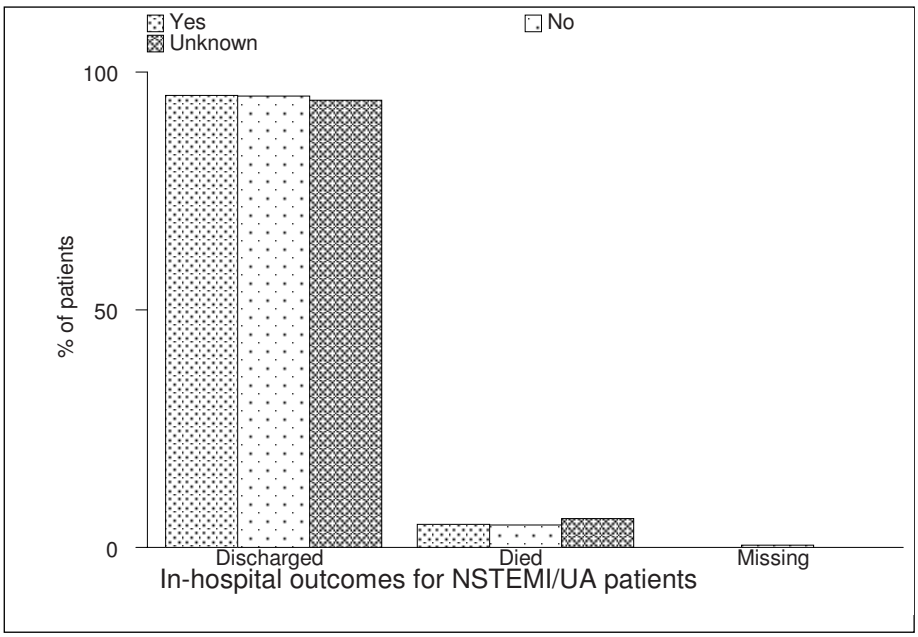



Figure 5.5.3b 30-day outcomes for patients with NSTEMI/UA by pre-admission aspirin use, Malaysia 2006

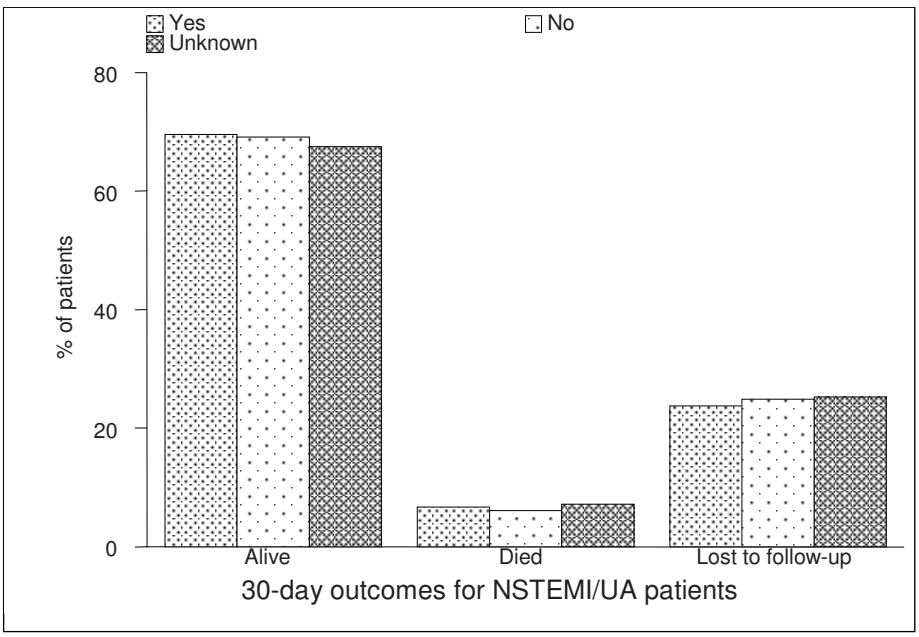


Table 5.6.1 Prognostic factors for death in hospital among STEMI patients, Malaysia 2006

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Age group, years | | | | |
| • 20 - <40 (ref) | 113 | 1.00 | - | - |
| • 40 - < 60 | 801 | 1.02 | (0.29, 3.67) | 0.97 |
| • > =60 | 527 | 1.93 | (0.53, 0.70) | 0.32 |
| | | | | |
| Gender | | | | |
| • Male (ref) | 1226 | 1.00 | - | - |
| • Female | 215 | 1.23 | (0.64, 2.39) | 0.53 |
| | | | | |
| Ethnic group* | | | | |
| • Malay | 777 | 0.82 | (0.32, 2.13) | 0.69 |
| • Chinese | 300 | 0.81 | (0.29, 2.35) | 0.68 |
| • Indian | 286 | 0.72 | (0.26, 2.01) | 0.53 |
| • Others (ref) | 78 | 1.00 | - | - |
| | | | | |
| Killip classification code | | | | |
| • I (ref) | 891 | 1.00 | - | - |
| • II | 288 | 2.02 | (1.17. 3.50) | 0.01 |
| • III | 62 | 3.37 | (1.54, 7.37) | 0.002 |
| • IV | 66 | 8.50 | (4.18, 17.27) | <0.001 |
| • Not stated/ inadequately described | 134 | 0.77 | (0.30, 2.01) | 0.59 |
| | | | | |
| Percutaneous coronary intervention | | | | |
| • Yes | 308 | 0.94 | (0.39, 2.26) | 0.88 |
| • No (ref) | 1133 | 1.00 | - | - |
| | | | | |
| Cardiac catheterization | | | | |
| • Yes | 298 | 0.84 | (0.34, 2.09) | 0.71 |
| • No (ref) | 1143 | 1.00 | - | - |
| | | | | |
| TIMI risk score | | | | |
| • 0-2 (ref) | 641 | 1.00 | - | - |
| • 3-4 | 375 | 1.09 | (0.55, 2.18) | 0.80 |
| • 5-7 | 337 | 2.03 | (1.09, 3.78) | 0.03 |
| • >7 | 88 | 6.78 | (3.22, 14.28) | <0.001 |
| Fibrinolytic therapy | | | | |
| • Given | 1014 | 0.67 | (0.43, 1.05) | 0.08 |
| • Not given (ref) | 427 | 1.00 | - | - |
| | | | | |

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Smoking | | | | |
| • Never (ref) | 417 | 1.00 | - | - |
| • Former (quit >30 days) | 270 | 4.43 | (1.89, 10.40) | 0.001 |
| • Current (any tobacco use within last 30 days) | 721 | 3.37 | (1.46, 7.82) | 0.01 |
| • Unknown | 33 | 2.37 | (0.80, 7.02) | 0.12 |
| | | | | |
| Family history of premature cardiovascular disease | | | | |
| • Yes | 168 | 3.28 | (1.23, 8.76) | 0.02 |
| • No (ref) | 742 | 1.00 | - | - |
| • Unknown | 531 | 0.75 | (0.40, 1.38) | 0.35 |
| | | | | |
| Dyslipidaemia | | | | |
| • Yes | 278 | 2.56 | (1.06, 6.15) | 0.04 |
| • No (ref) | 458 | 1.00 | - | - |
| • Unknown | 705 | 1.20 | (0.67, 2.18) | 0.53 |
| | | | | |
| Hypertension | | | | |
| • Yes | 680 | 5.15 | (2.24, 11.84) | <0.001 |
| • No (ref) | 433 | 1.00 | - | - |
| • Unknown | 328 | 1.00 | (0.43, 2.32) | 0.99 |
| | | | | |
| Diabetes | | | | |
| • Yes | 525 | 6.16 | (2.82, 13.45) | <0.001 |
| • No (ref) | 538 | 1.00 | - | - |
| • Unknown | 378 | 1.57 | (0.73, 3.39) | 0.25 |
| | | | | |
| Heart failure | | | | |
| • Yes | 48 | 0.99 | (0.38, 2.57) | 0.99 |
| • No (ref) | 1008 | 1.00 | - | - |
| • Unknown | 385 | 1.30 | (0.58, 2.92) | 0.53 |
| | | | | |
| Coronary artery disease** | | | | |
| • Yes | 779 | 1.06 | (0.48, 2.36) | 0.88 |
| • No (ref) | 356 | 1.00 | - | - |
| • Unknown | 306 | 1.15 | (0.46, 2.90) | 0.77 |
| | | | | |

**Others include Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner.*

***Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*

Table 5.6.2 Prognostic factors for death in hospital among NSTEMI/UA patients, Malaysia 2006

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Age group, years | | | | |
| • 20 - <40 (ref) | 53 | 1.00 | - | - |
| • 40 - < 60 | 871 | 1.37 | (0.16, 11.95) | 0.78 |
| • > =60 | 1050 | 3.80 | (0.45, 32.15) | 0.22 |
| | | | | |
| Gender | | | | |
| • Male (ref) | 1339 | 1.00 | - | - |
| • Female | 635 | 0.98 | (0.56, 1.71) | 0.93 |
| | | | | |
| Ethnic group* | | | | |
| • Malay | 901 | 1.56 | (0.44, 5.51) | 0.49 |
| • Chinese | 485 | 0.91 | (0.24, 3.39) | 0.89 |
| • Indian | 513 | 0.88 | (0.23, 3.36) | 0.85 |
| • Others (ref) | 75 | 1.00 | - | - |
| | | | | |
| Killip classification code | | | | |
| • I (ref) | 1247 | 1.00 | - | - |
| • II | 304 | 2.27 | (1.27, 4.04) | 0.01 |
| • III | 91 | 4.56 | (2.16, 9.60) | <0.001 |
| • IV | 34 | 11.74 | (4.81, 28.63) | <0.001 |
| • Not stated/ inadequately described | 298 | 0.78 | (0.36, 1.67) | 0.52 |
| | | | | |
| Percutaneous coronary intervention | | | | |
| • Yes | 242 | 0.64 | (0.26, 1.63) | 0.36 |
| • No (ref) | 1732 | 1.00 | - | - |
| | | | | |
| Cardiac catheterization | | | | |
| • Yes | 357 | 1.84 | (0.88, 3.85) | 0.10 |
| • No (ref) | 1617 | 1.00 | - | - |
| | | | | |
| TIMI risk score | | | | |
| • 0-2 (ref) | 1137 | 1.00 | - | - |
| • 3-4 | 689 | 0.72 | (0.43, 1.19) | 0.20 |
| • 5-7 | 148 | 1.94 | (0.88, 4.27) | 0.10 |
| | | | | |

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Smoking | | | | |
| • Never (ref) | 951 | 1.00 | - | - |
| • Former (quit >30 days) | 533 | 3.30 | (1.52, 7.16) | 0.002 |
| • Current (any tobacco use within last 30 days) | 414 | 2.46 | (1.03, 5.89) | 0.04 |
| • Unknown | 76 | 2.79 | (1.09, 7.12) | 0.03 |
| | | | | |
| Family history of premature cardiovascular disease | | | | |
| • Yes | 236 | 1.11 | (0.37, 3.33) | 0.86 |
| • No (ref) | 939 | 1.00 | - | - |
| • Unknown | 799 | 1.30 | (0.74, 2.30) | 0.36 |
| | | | | |
| Dyslipidaemia | | | | |
| • Yes | 852 | 1.22 | (0.53, 2.79) | 0.64 |
| • No (ref) | 443 | 1.00 | - | - |
| • Unknown | 679 | 0.64 | (0.32, 1.26) | 0.19 |
| | | | | |
| Hypertension | | | | |
| • Yes | 1401 | 1.57 | (0.70, 3.53) | 0.28 |
| • No (ref) | 352 | 1.00 | - | - |
| • Unknown | 221 | 0.37 | (0.14, 1.01) | 0.05 |
| | | | | |
| Diabetes | | | | |
| • Yes | 971 | 3.03 | (1.40, 6.55) | 0.01 |
| • No (ref) | 686 | 1.00 | - | - |
| • Unknown | 317 | 2.39 | (1.02, 5.60) | 0.05 |
| | | | | |
| Heart failure | | | | |
| • Yes | 236 | 2.15 | (1.18, 3.91) | 0.01 |
| • No (ref) | 1278 | 1.00 | - | - |
| • Unknown | 460 | 1.68 | (0.81, 3.52) | 0.17 |
| | | | | |
| Coronary artery disease** | | | | |
| • Yes | 1419 | 1.72 | (0.82, 3.61) | 0.15 |
| • No (ref) | 331 | 1.00 | - | - |
| • Unknown | 224 | 1.79 | (0.66, 4.84) | 0.25 |

**Others include Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner.*

***Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*

Table 5.6.3 Prognostic factors for death in 30 days among STEMI patients, Malaysia 2006

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Age group, years | | | | |
| • 20 - <40 (ref) | 88 | 1.00 | - | - |
| • 40 - < 60 | 581 | 1.18 | (0.39, 3.59) | 0.78 |
| • > =60 | 428 | 1.88 | (0.61, 5.84) | 0.28 |
| | | | | |
| Gender | | | | |
| • Male (ref) | 927 | 1.00 | - | - |
| • Female | 170 | 1.45 | (0.78, 2.70) | 0.24 |
| | | | | |
| Ethnic group* | | | | |
| • Malay | 588 | 1.35 | (0.51, 3.58) | 0.54 |
| • Chinese | 246 | 0.93 | (0.33, 2.60) | 0.88 |
| • Indian | 209 | 1.12 | (0.39, 3.18) | 0.83 |
| • Others (ref) | 54 | 1.00 | - | - |
| | | | | |
| Killip classification code | | | | |
| • I (ref) | 707 | 1.00 | - | - |
| • II | 223 | 1.40 | (0.84, 2.34) | 0.20 |
| • III | 49 | 2.64 | (1.20, 5.79) | 0.02 |
| • IV | 53 | 6.64 | (3.15, 14.00) | <0.001 |
| • Not stated/ inadequately described | 65 | 0.78 | (0.30, 2.06) | 0.63 |
| | | | | |
| Percutaneous coronary intervention | | | | |
| • Yes | 276 | 0.66 | (0.31, 1.42) | 0.29 |
| • No (ref) | 821 | 1.00 | - | - |
| | | | | |
| Cardiac catheterization | | | | |
| • Yes | 270 | 1.09 | (0.50, 2.38) | 0.82 |
| • No (ref) | 827 | 1.00 | - | - |
| | | | | |
| Fibrinolytic therapy | | | | |
| • Given | 776 | 0.54 | (0.35, 0.84) | 0.01 |
| • Not given (ref) | 321 | 1.00 | - | - |
| | | | | |
| TIMI risk score | | | | |
| • 0-2 (ref) | 492 | 1.00 | - | - |
| • 3-4 | 270 | 1.61 | (0.90, 2.89) | 0.11 |
| • 5-7 | 263 | 2.26 | (1.26, 4.04) | 0.01 |
| • >7 | 72 | 7.70 | (3.62, 16.40) | <0.001 |
| | | | | |
| Smoking | | | | |
| • Never (ref) | 314 | 1.00 | - | - |
| • Former (quit >30 days) | 200 | 5.19 | (2.33, 11.56) | <0.001 |
| • Current (any tobacco use within last 30 days) | 560 | 3.18 | (1.45, 6.97) | 0.01 |
| • Unknown | 23 | 1.74 | (0.55, 5.44) | 0.34 |
| | | | | |

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Family history of premature cardiovascular disease | | | | |
| • Yes | 127 | 4.23 | (1.76, 10.20) | 0.02 |
| • No (ref) | 583 | 1.00 | - | - |
| • Unknown | 387 | 0.96 | (0.53, 1.74) | 0.89 |
| | | | | |
| Dyslipidaemia | | | | |
| • Yes | 225 | 1.87 | (0.81, 4.29) | 0.14 |
| • No (ref) | 331 | 1.00 | - | - |
| • Unknown | 541 | 1.11 | (0.64, 1.93) | 0.71 |
| | | | | |
| Hypertension | | | | |
| • Yes | 534 | 4.92 | (2.24, 10.79) | <0.001 |
| • No (ref) | 308 | 1.00 | - | - |
| • Unknown | 255 | 1.11 | (0.49, 2.47) | 0.81 |
| | | | | |
| Diabetes | | | | |
| • Yes | 390 | 5.62 | (2.70, 11.71) | <0.001 |
| • No (ref) | 399 | 1.00 | - | - |
| • Unknown | 308 | 0.95 | (0.46, 2.00) | 0.90 |
| | | | | |
| Heart failure | | | | |
| • Yes | 37 | 2.12 | (0.84, 5.37) | 0.11 |
| • No (ref) | 780 | 1.00 | - | - |
| • Unknown | 280 | 1.57 | (0.71, 3.46) | 0.27 |
| | | | | |
| Coronary artery disease** | | | | |
| • Yes | 599 | 0.86 | (0.40, 1.87) | 0.71 |
| • No (ref) | 258 | 1.00 | - | - |
| • Unknown | 240 | 1.28 | (0.53, 3.10) | 0.59 |
| | | | | |

**Others include Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner.*

***Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*

Table 5.6.4 Prognostic factors for death in 30 days among NSTEMI/UA patients, Malaysia 2006

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Age group, years | | | | |
| • 20 - <40 (ref) | 35 | 1.00 | - | - |
| • 40 - < 60 | 639 | 0.65 | (0.13, 3.20) | 0.60 |
| • > =60 | 819 | 1.97 | (0.41, 9.52) | 0.40 |
| | | | | |
| Gender | | | | |
| • Male (ref) | 1028 | 1.00 | - | - |
| • Female | 465 | 0.97 | (0.59, 1.58) | 0.89 |
| | | | | |
| Ethnic group* | | | | |
| • Malay | 631 | 1.13 | (0.41, 3.12) | 0.82 |
| • Chinese | 403 | 0.62 | (0.21, 1.79) | 0.37 |
| • Indian | 400 | 0.75 | (0.26, 2.18) | 0.59 |
| • Others (ref) | 59 | 1.00 | - | - |
| | | | | |
| Killip classification code | | | | |
| • I (ref) | 967 | 1.00 | - | - |
| • II | 266 | 1.88 | (1.13, 3.11) | 0.02 |
| • III | 82 | 3.20 | (1.60, 6.40) | 0.001 |
| • IV | 28 | 6.96 | (2.82, 17.21) | <0.001 |
| • Not stated/ inadequately described | 150 | 1.07 | (0.55, 2.06) | 0.84 |
| | | | | |
| Percutaneous coronary intervention | | | | |
| • Yes | 219 | 0.64 | (0.29, 1.43) | 0.28 |
| • No (ref) | 1274 | 1.00 | - | - |
| | | | | |
| Cardiac catheterization | | | | |
| • Yes | 334 | 1.43 | (0.75, 2.70) | 0.28 |
| • No (ref) | 1159 | 1.00 | - | - |
| | | | | |
| TIMI risk score | | | | |
| • 0-2 (ref) | 806 | 1.00 | - | - |
| • 3-4 | 554 | 0.76 | (0.48, 1.18) | 0.22 |
| • 5-7 | 133 | 1.53 | (0.76, 3.05) | 0.23 |
| | | | | |
| Smoking | | | | |
| • Never (ref) | 714 | 1.00 | - | - |
| • Former (quit >30 days) | 428 | 2.43 | (1.25, 4.72) | 0.01 |
| • Current (any tobacco use within last 30 days) | 298 | 1.84 | (0.85, 3.926) | 0.12 |
| • Unknown | 53 | 1.63 | (0.65, 4.12) | 0.30 |
| | | | | |

| Factors | N | Odd ratio | 95% CI | P-value |
|---|---|---|---|---|
| Family history of premature cardiovascular disease | | | | |
| • Yes | 176 | 1.29 | (0.51, 3.31) | 0.59 |
| • No (ref) | 699 | 1.00 | - | - |
| • Unknown | 618 | 1.28 | (0.77, 2.12) | 0.34 |
| | | | | |
| Dyslipidaemia | | | | |
| • Yes | 688 | 0.95 | (0.47, 1.93) | 0.90 |
| • No (ref) | 297 | 1.00 | - | - |
| • Unknown | 508 | 0.57 | (0.31, 1.05) | 0.07 |
| | | | | |
| Hypertension | | | | |
| • Yes | 1062 | 1.38 | (0.67, 2.86) | 0.38 |
| • No (ref) | 265 | 1.00 | - | - |
| • Unknown | 166 | 0.51 | (0.20, 1.26) | 0.14 |
| | | | | |
| Diabetes | | | | |
| • Yes | 763 | 3.12 | (1.58, 6.16) | 0.001 |
| • No (ref) | 496 | 1.00 | - | - |
| • Unknown | 234 | 1.70 | (0.78, 3.71) | 0.18 |
| | | | | |
| Heart failure | | | | |
| • Yes | 195 | 1.70 | (0.98, 2.96) | 0.06 |
| • No (ref) | 955 | 1.00 | - | - |
| • Unknown | 343 | 1.95 | (1.02, 3.71) | 0.04 |
| | | | | |
| Coronary artery disease** | | | | |
| • Yes | 1089 | 1.78 | (0.92, 3.46) | 0.09 |
| • No (ref) | 247 | 1.00 | - | - |
| • Unknown | 157 | 1.64 | (0.67, 4.01) | 0.28 |
| | | | | |

**Others include Orang asli, Kadazan, Melanau, Murut, Bajau, Bidayuh, Iban, other Malaysian and foreigner.*

***Coronary artery disease is defined as "Yes" on any of the following co-morbidities: 1) History of myocardial infarction, 2) Documented CAD >50% stenosis, 3) Chronic angina (onset more than 2 weeks ago), 4) New onset angina (less than 2 weeks).*

# APPENDIX A: DATA MANAGEMENT

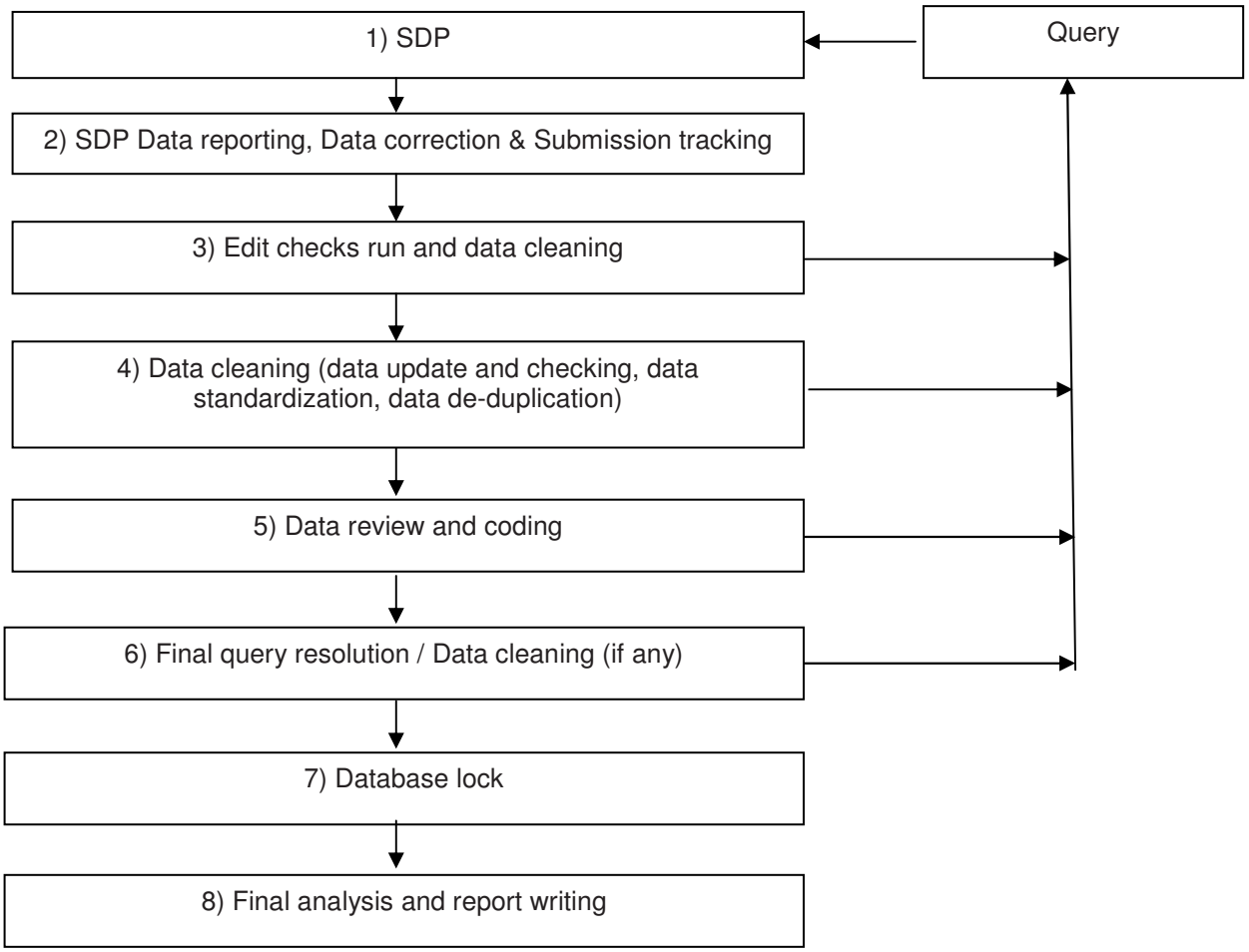
The National Cardiovascular Disease Database (NCVD) Registry maintains two different databases for cardiovascular disease, i.e. for Acute Coronary Syndrome and Percutaneous Coronary Intervention. Data is stored in SQL Server due to the high volume of data accumulated throughout the years.

**Data sources**

SDPs or Source Data Providers of NCVD-ACS registry comprise of hospitals with cardiologists and physicians who participated in the registry throughout Malaysia.

**Data Flow Process**

This section describes the data management flow process of the National Cardiovascular Disease Database Registry.



**SDP Data reporting, Data correction and Submission tracking**

Data reporting by SDP is done via Web Applications e-Case Report Forms.

There are a number of data security features that are designed into NCVD web application (eCRF) such as web owner authentication, 2-level user authentication (user name and password authentication and a Short Messaging System (SMS) of authorization code to mobile phone authentication), access control, data encryption, session management to automatically log off the application, audit trail and data backup and disaster recovery plan.

SDP submits NCVD-ACS Notification form on ad hoc basis whenever there is a case. SDP also submits follow-up data at 30 days, 1 year and other ad hoc follow-ups post notification date. An alert page containing all the overdue submissions for follow up at 30-day and 1-year post notification date is available to users to ease submissions tracking.

Prior to registering a patient record, a verification process is done by using the search function to identify if the patient exists in the entire registry. The application will still detect a duplicate record if the same IC number is keyed in should the step of searching patient be left out. This step is done to avoid duplicate of records. For patients that exist in the database, SDP merely needs to add a new ACS or PCI notification with basic patient particulars pre-filled based on existing patient information in the database. ACS and PCI share the same patient list.

There are a few in-built functionalities at the data entry page that serve to improve data quality. One such function is the auto calculation which is to reduce error of human calculation. There is also a function for inconsistency check that disables certain fields if these fields are answered in a certain manner. When value entered is out of range, user is prompted for the correct value.

A real-time data query page is also available via the web application to enable user to check which of the non-compulsory data is missing, out of range and inconsistent. A link is provided on the data query page for the user to click on to resolve the query for the particular patient.

Real-time reports are also provided in the web application. The aggregated data reports are presented as tables and graphs. The aggregated data reports are typically presented in two manners, the first as centre's own data aggregated data report and second as registry's overall aggregated data report. This way, the centre is able to be compared against the overall registry's average.

Data download function is also available in the web application to allow users to download their own centre's data for all the forms entered for their own further analysis. The data are downloadable as Text - tab delimited (.txt) format, Microsoft excel workbook (.xls) and Comma separated value (.csv) format.

**Edit checks run and Data cleaning**

Edit check was performed periodically by the registry manager to identify missing compulsory data, out of range values, inconsistency data, invalid values and error with de-duplication. Data cleaning is then performed based on the results of edit checks. Data update and data checking of the dataset are performed when there is a query of certain fields whenever necessary. It could be due to request by user, correction of data based on checking from data query in eCRF or after receiving results for preliminary data analysis. During data standardization, missing data are handled based on derivation from existing data. Data de-duplication is also performed to identify duplicate records in the database that might have been missed by SDP.

**Final query resolution / Data cleaning / Database lock**

A final edit check run was performed to ensure that data is clean. All queries were resolved before database is locked to ensure data quality and integrity. Final dataset is subsequently locked and exported to the statistician for analysis.

**Data analysis**

Please refer to section on Statistical Methods section for further details.

**Data release policy**

One of the primary objectives of the Registry is to make data available to the cardiovascular healthcare providers, policy makers and researchers. The Registry would appreciate that users acknowledge the Registry for the use of the data. Any request for data that requires a computer run must be made in writing (by e-mail, fax, or registered mail) accompanied with a Data Release Application Form and signed Data Release Agreement Form. These requests need prior approval by the Advisory Board before data can be released.

**Registry ICT Infrastructure and Data centre**

The operations of the NCVD are supported by an extensive ICT infrastructure to ensure operational efficiency and effectiveness.

NCVD subscribes to co-location service with a high availability and highly secured Internet Data Centre at Cyberjaya in order to provide NCVD with quality assured Internet Hosting services and state-of-the-art physical and logical security features without having to invest in costly internal data centre setup. Physical security features implemented includes state of the art security features such as anti-static raised flooring, fire protection with smoke and heat alarm warning system, biometric security access, video camera surveillance system, uninterrupted power supply, environmental control, etc.

Other managed security services include patch management of the servers, antivirus signature monitoring and update, firewall traffic monitoring and intrusion detection, security incidence response, daily, weekly and monthly basis data backup service, at least once yearly data recovery simulation to verify that backup works, half-yearly network security scan and penetration test, security policy maintenance, maintenance and monitoring of audit trail of user access, etc. Managed system services are also provided and these include usage and performance report, operating system maintenance and monitoring, bandwidth monitoring and systems health monitoring.

# APPENDIX B: STATISTICAL METHODS

The statistical methods described were used to summarize the data collected from the National Cardiovascular Database (NCVD). In this report, two sources of data have been used for analysis. They were the centre survey data and the NCVD ACS registry data.

**Provision of acute coronary care services in Malaysia**

Chapter 1 of this report was based on the centre survey data rather than individual patient data reported to the database. This was to provide up-to-date information on patient and centre census in the country and thus overcome the inevitable time lag between processing individual patient data and subsequent reporting of results. The survey was conducted from November 15th 2007 to March 5th 2008. 73 out of 273 hospitals that approached through telephone survey were confirmed with availability of CCU services. Only 69 centres managed to return the survey form completely. Standard error estimates were not reported because no sample was taken. Results on distribution for Malaysia as a whole and also by state were expressed in per million-population since states obviously vary in their population sizes. State population data were based on the last census projection obtained from the Department of Statistics in Malaysia[1]. Missing data on ASC services, admissions, utilization of acute coronary or cardiac services and cardiac care are estimated based on the sampling weight of the total beds in each hospital.

The analyses for the rest of this report were generated based on the NCVD ACS registry data, using the following analysis set:

The data without missing on initial diagnosis, final diagnosis is neither stable angina nor non-cardiac, and age at least 20 that were collected until 31st December 2006 by NCVD-ACS were analyzed. The data was stratified to reflect differences in

- Demography: race, gender, age
- Medical factors: premorbid or past medical history
- Initial diagnoses: ACS stratums
- Therapy: fibrinolytic given, aspirin use

**Methods for handling missing data and outliers**

Missing age was imputed using the hotdeck method. The outliers were set to missing (see table below)

| Fields | Acceptable range |
|---|---|
| Number of distinct episodes of angina | ≤20 |
| Heart rate | 25 – 200 beats/min (should not be 0) |
| Systolic BP | 60 – 230 mmHg (should not be 0) |
| Diastolic BP | 10 – 120 mmHg |
| Height | 130cm – 210cm |
| Weight | 30kg - 200kg |
| Waist circumference | ≥ 36cm |
| Hip circumference | 60 - 200cm |
| Peak CK-MB | <1000 Unit/L (should not be 0) |
| Peak CK | <10 000 Unit/L (should not be 0) |
| Peak Troponin – TnT | No range |
| Peak Troponin – TnI | No range |
| TC | 3 - 20 mmol/L |
| LDL | 1 - 15 mmol/L |
| HDL-C | 0.5 - 5 mmol/L |
| Tg | 1 -15 mmol/L |
| Fasting Blood Glucose | 3 - 30 mmol/L |
| Left Ventricular Ejection Fraction | 5% - 80% |
| Onset to door | Should not be 0 |
| Door to needle time (mins) | 1 min -24 hours (or equivalent minutes) (should not be 0) |
| Door to balloon time (mins) | 1 min-24 hours (or equivalent minutes) Apply only for patients with STEMI and planned for primary angioplasty (should not be 0) |

**Patient Characteristics**

The information on patient characteristics was summarized in chapter 2 of the report. These tables included patients' age, gender, ethnic group, coronary risk factors, anthropometric measurements, co-morbidity, and also the distribution of patients by source data providers (SDP). For summarizing continuous data, the mean, standard deviation, median, minimum and maximum were reported. On the other hand, both the frequency count and percentage were reported for discrete data. Invariably, there were situations where there was missing data. For the purpose of analysis, subjects with missing age had their values imputed by using a hotdeck imputation method. For discrete data, analysis was confined to available data and no imputation was done.

**Cardiac Presentation**

Chapter 3 of the report basically was to summarize the patient characteristics, vital sign measurements, and laboratory parameters by ACS stratum such as STEMI, NSTEMI and UA, age groups namely young, middle-age and elderly, gender as well as the pre-morbid conditions such as diabetes, hypertension, and dyslipidaemia. For continuous data, the mean, standard deviation, median, minimum and maximum were reported. On the other hand, frequency count and percentage were reported for discrete data. Only the missing age was imputed for the purpose of analysis.

**Treatment**

The treatments that were provided to the patients were mainly summarized in chapter 4 of the report. This information was cross tabulated by ACS stratum, age group, gender as well as the main ethnic group in Malaysia. No imputation was done for this chapter.

**Clinical Outcomes**

Chapter 5 of the report summarized the overall in-hospital as well as 30-day outcomes for patients with ACS. Cross tabulations of outcomes by gender, pre-morbid conditions such as diabetes, hypertension, dyslipidaemia, and ACS stratum were included in this chapter. Tabulation of outcomes by fibrinolytic therapy was only presented for STEMI patients. Other tabulations such as outcomes by percutaneous coronary intervention at admission, CABG at admission, and also the pre-admission aspirin use were presented separately for patients with STEMI and NSTEMI/UA. Prognostic factors for in-hospital death as well as death in 30 days were summarized separately for STEMI and NSTEMI/UA patients. No imputation was done for this chapter.

**Reference**

1. Department of Statistics. Yearbook of Statistics.2002. Malaysia

## APPENDIX C: PARTICIPATING CENTRE DIRECTORY

**Ipoh Hospital**

c/o Medical Department,
Jalan Hospital,
30450 Ipoh,
Perak.

Tel: 05-253 3333
Fax: 05-253 1541
Investigator:
Dr Khor Chiew Gek

Study coordinator:
Sr Zainab Yeop Ahmad

**Kuala Lumpur Hospital**

c/o Medical Department,
Jalan Pahang,
50586 Kuala Lumpur.

Tel: 03-2615 6150
Fax: 03-2692 5920
Investigator:
Dato' Dr Jeyaindran Sinnadurai

Study coordinators:
S/N Thavamalar Rajanayagam
S/N Sarah Md Yusof

**Malacca Hospital**

c/o Medical Department,
Jalan Mufti Haji Khalil,
75400 Melaka,

Tel: 06-282 2344
Fax: 06-284 1590
Investigator:
Dr Sharifah Omar

Study coordinator:
S/N Faridah Sharif

**National Heart Insitute**

c/o Cardiology Department,
145, Jalan Tun Razak,
50400 Kuala Lumpur.

Tel: 03-2617 8200
Fax: 03-2698 2824
Investigator:
Dato' Dr Azhari Rosman

Study coordinators:
Nadiah Sulaiman
Intan Safarinaz Sabian

**Penang Hospital**

c/o Cardiology Department,
Jalan Pahang,
50586 Kuala Lumpur.

Tel: 03-2615 6150
Fax: 03-2692 5920
Investigators:
Dato' Dr Omar Ismail
Dr Liew Chee Tat

Study coordinators:
S/N Chong Hooi Joo
S/N Norhafiza Abdul Aziz

**Queen Elizabeth Hospital**

c/o Medical Department,
Beg Berkunci 2029,
88586 Kota Kinabalu,
Sabah.

Tel: 088-218 166
Fax: 088-318 605
Investigator:
Dr Phanindtranath Mahadasa

Study coordinators:
Sr Wong Kath Koau
Sr Lawasa Mojimbal

**Raja Perempuan Zainab II Hospital**

c/o Medical Department,
Jalan Hospital,
15000 Kota Bharu
Kelantan.

Tel: 09-745 2000
Fax: 09-747 9532
Investigator:
Dr Monniaty Mohamed

Study coordinators:
S/N Zuryanawati Ahmad Sekeri
S/N Wan Ruzita Wan Hassan

**Sarawak General Hospital**

c/o Medical Department,
Jalan Tun Ahmad Zaidi Adruce,
93586 Kuching,
Sarawak.

Tel: 082-276 666
Fax: 082-240 767

Investigators:
Dr Loh Chek Loong
Dr Kalwinder S Khaira

Study coordinators:
J/M Kho Siew Moi
S/N Mary Kempo Tahak

**Sultanah Aminah Hospital**

c/o Cardiology Department,
Jalan Skudai,
80100 Johor Bahru,
Johor.

Tel: 07-223 1666
Fax: 07-225 7245
Investigator:
Dr Lee Chuey Yan
Dr Lu Hou Tee

Study coordinators:
Sr Rokayah Ismail
S/N Delailah Ithnin

**Sarawak General Hospital**

c/o Cardiology Department,
Jalan Tun Ahmad Zaidi Adruce,
93586 Kuching,
Sarawak.

Tel: 082-276 666
Fax: 082-278 308
Investigators:
Prof. Dr Sim Kui-Hian
Dr Ang Choon Kiat

Study coordinators:
Sr Ngu Ching Huong
S/N Cenderella Nuah

**Seberang Jaya Hospital**

c/o Medical Department,
13700 Perai,
Seberang Jaya,
Pulau Pinang.

Tel: 04-382 7333
Fax: 04-397 0754

Investigator:
Dr Ang Hock Aun

Study coordinator:
Sr Hasmah Salleh

**Sultanah Bahiyah Hospital**

c/o Medical Department,
KM 6, Jalan Langgar,
05460 Alor Setar,
Kedah.

Tel: 04-740 6203
Fax: 04-740 6154
Investigator:
Dr Hasmannizar Abd Manap

Study coordinator:
S/N Zarina Abdul Hamid

**Sultanah Nur Zahirah Hospital**

c/o Medical Department,
Jalan Sultan Mahmud,
20400 Kuala Terengganu,
Terengganu.

Tel: 09-621 2121
Fax: 09-622 1820
Investigator:
Dr Wan Mohd Razin Wan Hassan

Study coordinator:
Sr Nor Asiah Mohamad

**Tengku Ampuan Rahimah Hospital**

c/o Medical Department,
Jalan Langat,
41200 Klang,
Selangor.

Tel: 03-3375 6233
Fax: 03-3372 9089
Investigator:
Datin Paduka Dr Santha Kumari

Study coordinator:
S/N Salbiah

**Tuanku Ja'afar Hospital**

c/o Medical Department,
Jalan Rasah,
70300 Seremban,
Negeri Sembilan

Tel: 06-762 3333
Fax: 06-762 5771
Investigators:
Dato' Dr Sree Raman
Dr Cham Yee Ling

Study coordinator:
S/N Narizan Zulkifli

**Tengku Ampuan Afzan Hospital**

c/o Medical Department,
Jalan Tanah Putih,
25100 Kuantan,
Pahang.

Tel: 09-557 2322
Fax: 09-516 4272
Investigators:
Dr Azarisman Shah Mohd Shah
Dr Harris Ngow Abdullah

Study coordinators:
Sr Ong Siew Geok
S/N Asanah Asbi

**Tuanku Fauziah Hospital**

c/o Medical Department,
Jalan Kolam,
01000 Kangar,
Perlis.

Tel: 04-976 3333
Fax: 04-976 7237
Investigators:
Dr Sia Koon Ket
Dr Khor Boon Tat

Study coordinators:
Sr Zauriah Abu Bakar
S/N Rusmira Ramli

**University Malaya Medical Centre**

c/o Medical Department,
Lembah Pantai,
59100 Kuala Lumpur.

Tel: 03-7949 2821
Fax: 03-7949 2611
Investigators:
Prof. Dr Wan Azman Wan Ahmad
Dr Chong Wei Peng

Study coordinators:
Ms Manhaiyun Alwi
Ms Suzanna Hani Hussein

## APPENDIX D: CCU SURVEY PARTICIPATION

We extend our appreciation to the following centres that have contributed in the CCU survey for year 2006, conducted from November 2007 to March 2008:

**Ampang Hospital**
Jalan Mewah Utara, Pandan Mewah,
68000 Ampang,
Selangor

**Ampang Puteri Specialist Hospital**
1 Jalan Mamanda 9,
Taman Dato' Ahmad Razali,
68000 Ampang,
Selangor

**Assunta Hospital**
Lot 68 Jalan Templer,
46990 Petaling Jaya,
Selangor

**Bintulu Hospital**
Jalan Nyabau,
97000 Bintulu,
Sarawak

**Bukit Mertajam Hospital**
Jalan Kulim,
14000 Bukit Mertajam,
Seberang Perai,
Pulau Pinang

**Damansara Specialist Hospital**
119, Jalan SS20/10 Damansara Utama,
47400 Petaling Jaya,
Selangor

**Gleneagles Intan Medical Centre**
282-286 Jalan Ampang,
50450 Kuala Lumpur

**Gleneagles Medical Centre**
1 Jalan Pangkor ,
10050 Georgetown,
Pulau Pinang

**Kuala Lumpur Hospital**
Jalan Pahang,
50586 Kuala Lumpur

**Kuantan Clinical Diagnostic Centre**
A 37, Jalan Dato' Lim Hoe Lek,
25000 Kuantan
Pahang

**Ipoh Hospital**
Jalan Hospital,
30990 Ipoh,
Perak

**Ipoh Specialist Hospital**
26 Jalan Raja Dihilir,
30350 Ipoh,
Perak

**Island Hospital**
308 Macalister Road,
10450 Georgetown,
Pulau Pinang

**Johor Specialist Hospital**
39-B, Jalan Abdul Samad,
80100 Johor Bahru,
Johor

**Kajang Hospital**
Jalan Semenyih,
43000 Kajang,
Selangor

**Keningau Hospital**
KM 5, Jalan Apin-Apin, Keningau,
Peti Surat 11,
89007 Keningau,
Sabah

**Kepala Batas Hospital**
Jalan Bertam,
13200 Kepala Batas,
Pulau Pinang

**Koh Cardiology and Medical Clinic Sdn. Bhd.**
Perak Community Specialist Hospital,
No. 277, Jalan Permaisuri Bainun,
30250 Ipoh,
Perak

**Normah Medical Specialist Centre**
Jalan Tun Abdul Rahman, Petra Jaya,
93050, Kuching
Sarawak

**Pantai Ayer Keroh Hospital Sdn. Bhd.**
No.2418-1, KM 8 Lebuh Ayer Keroh,
75450 Melaka

**Kulim Hospital**
Jalan Mahang,
09000 Kulim,
Kedah

**Lam Wah Ee Hospital**
141, Jalan Tan Sri Teh Ewe Lim,
11600 Georgetown,
Pulau Pinang

**Loh Guan Lye Specialist Centre**
19 & 21, Jalan Logan,
10400 Georgetown,
Pulau Pinang

**Mahkota Medical Centre**
No. 3 Mahkota Melaka, Jalan Merdeka,
75000 Melaka

**Malacca Hospital**
Jalan Mufti Haji Khalil,
75400 Bandar Melaka,
Melaka

**Metro Specialist Hospital**
No.1 Lorong Metro,
08000 Sungai Petani,
Kedah

**National Heart Institute**
145 Jalan Tun Razak
50400 Kuala Lumpur

**Pusrawi Hospital Sdn. Bhd.**
Lot 149, Jalan Tun Razak,
50400 Kuala Lumpur

**Puteri Specialist Hospital**
33 Jalan Tun Abdul Razak (Susur 5),
80350 Johor Bahru,
Johor

**Putra Specialist Hospital (Malacca) Sdn. Bhd.**
169, Jalan Bendahara,
75100 Melaka

**Putrajaya Hospital**
Pusat Pentadbiran Kerajaan Persekutuan,
Presint 7,
62250 Putrajaya

**Queen Elizabeth Hospital**
Karung Berkunci No 2029,
88586 Kota Kinabalu,
Sabah

**Pantai Indah Hospital Sdn. Bhd.**
Jalan Perubatan 1, Pandan Indah,
55100 Kuala Lumpur

**Pantai Medical Centre**
8 Jalan Bukit Pantai,
59100 Kuala Lumpur

**Pekan Hospital**
26600 Pekan,
Pahang

**Penang Adventist Hospital**
465, Jalan Burma
10350 Pulau Pinang

**Penang Hospital**
Jalan Residensi,
10900 Georgetown,
Pulau Pinang

**Perdana Specialist Hospital**
Suite 19, Lot PT37 & 600,
Seksyen 14, Jalan Bayam,
15200 Kota Bharu,
Kelantan

**Port Dickson Hospital**
KM 11 Jalan Pantai, Sirusa,
71050 Port Dickson,
Negeri Sembilan

**Selangor Medical Centre**
Lot 1, Jalan Singa 20/1 Section 20,
40300 Shah Alam
Selangor

**Selayang Hospital**
Lebuhraya Selayang-Kepong,
68100 Batu Caves,
Selangor

**Sentosa Medical Centre**
36 Jalan Chemur,
Damai Complex,
50400 Kuala Lumpur

**Serdang Hospital**
Jalan Puchong,
43000 Kajang,
Selangor

**Seremban Specialist Hospital**
Lot 6219 & 6220, Jalan Toman 1,
Kemayan Square,
70200 Seremban,
Negeri Sembilan

**Raja Perempuan Zainab II Hospital**
Jalan Hospital,
15586 Kota Bharu,
Kelantan

**Sabah Medical Centre**
Lorong Bersatu, Off Jalan Damai, Luyang,
88300 Kota Kinabalu,
Sabah

**Sarawak General Hospital**
Jalan Tun Ahmad Zaidi Adruce,
93586 Kuching,
Sarawak

**Seberang Jaya Hospital**
Jalan Tun Hussein Onn,
13700 Seberang Perai,
Pulau Pinang

**Subang Jaya Medical Centre**
1 Jalan SS12/1A,
47500 Subang Jaya,
Selangor

**Sultan Abdul Halim Hospital**
Jalan Lencongan Timur,
Bandar Amanjaya,
08000 Sungai Petani,
Kedah

**Sultan Haji Ahmad Shah Hospital**
28000 Temerloh,
Pahang

**Sultan Ismail Hospital**
Jalan Persiaran Mutiara Emas Utama,
Taman Mount. Austin,
81100 Johor Bahru,
Johor

**Sultanah Aminah Hospital**
Jalan Skudai,
80100 Johor Bahru,
Johor

**Sultanah Bahiyah Hospital**
KM 6, Jalan Langgar,
05460 Alor Star,
Kedah

**Sultanah Fatimah Specialist Hospital**
Jalan Salleh,
84000 Muar,
Johor

**Seri Manjung Hospital**
32040 Seri Manjung,
Perak

**Sibu Hospital**
Batu 5 ½, Jalan Ulu Oya,
96000 Sibu,
Sarawak

**Slim River Hospital**
35800 Slim River,
Perak

**Sri Kota Specialist Medical Centre**
Lot 167-172, Jalan Mohet,
41000 Klang,
Selangor

**Taiping Hospital**
Jalan Taming Sari,
34000 Taiping,
Perak

**Tawakal Specialist Centre**
202A Jalan Pahang,
53000 Kuala Lumpur

**Tawau Hospital**
Peti Surat 67,
91007 Tawau,
Sabah

**Teluk Intan Hospital**
Jalan Changkat Jong,
36000 Teluk Intan,
Perak

**Tengku Ampuan Afzan Hospital**
Jalan Tanah Putih,
25100 Kuantan,
Pahang

**Timberland Medical Centre**
Lot 5164-5165 Block 16 KCLD
2 ½ Mile Rock Road,
Taman Timberland,
93250 Kuching,
Sarawak

**Tuanku Ampuan Najihah Hospital**
72000 Kuala Pilah,
Negeri Sembilan

**Sultanah Nur Zahirah Hospital**
Jalan Sultan Mahmud,
20400 Kuala Terengganu,
Terengganu

**Sunway Medical Centre**
No.5, Jalan Lagoon Selatan,
Bandar Sunway,
46150 Petaling Jaya,
Selangor

**Universiti Kebangsaan Malaysia Hospital**
Jalan Ya'acob Latif,
Bandar Tun Razak,
56000 Cheras,
Kuala Lumpur

**Universiti Malaya Medical Centre**
Lembah Pantai,
59100 Kuala Lumpur

**Tuanku Fauziah Hospital**
Jalan Kolam,
01000 Kangar,
Perlis

**Tuanku Ja'afar Hospital**
Jalan Rasah,
70300 Seremban,
Negeri Sembilan

**Universiti Sains Malaysia Hospital**
Jalan Raja Perempuan Zainab II,
16150 Kubang Kerian,
Kelantan

## APPENDIX E: NOTE OF APPRECIATION

A heart-felt **appreciation** is extended to everyone who has contributed to the successful publication of this the inaugural report.

**Independent reviewer**

Assoc Prof Wong Su Chen

**Clinical Research Centre**

Dato' Dr Zaki Morad Mohd Zaher
Dr Lim Teck Onn
Dr Jamaiyah Haniff
Dr Anita Das
Dr Sharon Chen
Madam Celine Tsai
Mrs Hanizah Hashim
Kevin Ng
Ng Foong Yeang
Geeta Appannah
Halijah Hassan
Tan Pei Ting
Azlan Mohd Dahari
Lim Jie Ying
Sebastian Thoo
John Chong
Amy R Porle
Teo Jau Shya
Vijayaghanthi Perumal
Tan Wei Hao
Jasmine Chew
Raja'ah Meor
Teh Poh Geok
Mohamad Adam Bujang
Syazuan Ruslan
Azizah Alimat
Azizi Abd Rahman
S Gunavathy Selvaraj
Noor Amirah Muhamad
Hamimatunnisa Johar
Anne John Michael

**University Malaya Medical Centre**

Prof Dr Wan Azman Wan Ahmad
Dr Haizal Haron Kamar
Dr Imran Zainal Abidin
Dr Nik Halmey Nik Zainal Abidin
Dr Chong Wei Peng
Dr Chee Kok Han
Dr Ramesh Singh Veriah
Dr Syahidah Syed Tamin
Dr Zulhilmi Yaacob
Dr Wong Toi Chong
Sr Kang Wei Ju
Manhaiyun Alwi
Suzanna Hani Hussein
Kartini Abdul Wahid
Azizah Abdul Aziz
Siti Zainab Rosdi

**Tengku Ampuan Afzan Hospital**

Dato' Dr Sapari Satwi
Dr Harris Ngow Abdullah
Dr Azarisman Shah Mohd Shah
Dr Puteri Melor Abdul Malik
Dr Yew Kuan Leong
Dr Sujana L. S. Saravanamuthu
Sr Ong Siew Geok
S/N Asanah Asbi
S/N Zawiah Jusoh
S/N Zarina Ismail
S/N Chooi Lee Ling
S/N Kkairos Karim
S/N Nor Irdawaty Samsudin
S/N Aminah Safina Ishak
S/N Afzarinie Ismail
S/N Basariah Hassan

S/N Zuhaini Ismail
S/N Suzilawani Ghani
Noor Azlin Asnam
Noor Shafiruz

**Tuanku Fauziah Hospital**
Dr Sia Koon Ket
Dr Khor Boon Tat
Dr Khaled Mohamed Helmy
Dr Yuhanis Yusof
Dr Abd Karim Abdullah
Dr Nurulraziquin Mohd Jamid
Sr Jamaliah Osman
Sr Zauriah Abu Bakar
Sr Teh Guat Hua
S/N Rusmira Ramli
S/N Rasubivi Oli Mohamed
S/N Zaliza Said

**National Heart Institute**
Dato' Seri Dr Robaayah Zambahari
Dato' Dr Rosli Mohd Ali
Dato' Dr Hj Azhari Rosman
Dato' Dr David Chew Soon Ping
Dato' Dr Amin Ariff Nuruddin
Dato' Dr K Balachandran
Datuk Dr Mohd Nasir Muda
Dr Razali Omar
Dr Aizai Azan Abd Rahim
Dr Lam Kai Huat
Dr Azlan Hussin
Dr Shaiful Azmi Yahaya
Dr Ahmad Khairuddin
Dr Emily Tan Lay Koon
Dr Surinder Kaur
Dr Chong Yoon Sin
Dr Mohd Rahal Yusoff
Dr Ismail Yaakob
Dr Tan Huat Chai
Dr Sanjiv Yoshi
Dr Ng Kok Huan
Dr Tiang Soon Wee
Dr Hasral Noor Hasni
Dr Foong Yi Kwan
Dr Kevin Joseph
Dr Hazlyna Kamaruddin
Nurain Jurnalis Rizal
Nadiah Sulaiman
Intan Safarinaz Sabian
Juriah Abdul Hamid
Irni Yusnida M Rashid

**International Medical Univeristy**
Assoc Prof Dr Chin Sze Piaw

**Kuala Lumpur Hospital**
Dato' Dr Jeyaindran Sinnadurai
S/N Thavamalar Rajanayagam
S/N Sarah Md Yusof
S/N Saroha Salim
S/N Aishah Saleh
S/N Norazlin Manap

**Penang Hospital**
Dato' Dr Omar Ismail
Dr Liew Chee Tat
Dr Safari Elis
Dr Goh Tech Hwa
Dr Lim Seh Kin
Dr Abdul Hadi Jaafar
Dr Mansor Yahya
Dr Barakath Badusha
Dr Muhamad Ali Sheikh Abd Kader
Dr Siti Khairani
Dr Chan Kok Kheng
Dr Najhan Mazwan
Dr Evelyn Chan Kam Yeen
Dr Shama Mohamed Noohu
Dr Tee Chee Hien
Dr Fahmida Ilyas

Dr Bushra Ilyas
Sr Mahani Din
Sr Masni Harun
Sr Tan Ahr Er
Sr Jamelah Ahmad
S/N Balkhis Ahmad
S/N Natrah Omar
S/N Natrah Abd Radzak
S/N Nurhuda Che Kalib
S/N Azizah Yusuf
S/N Normilah Yahaya
S/N Nursyamsinar Abu Bakar
S/N Masyidawati Mohd Rodzi
S/N Chong Hooi Joo
S/N Norhafiza Abdul Aziz
S/N Suraidah Ramli

**Sarawak General Hospital**
Prof Dr Sim Kui Hian
Dr Ang Choon Kiat
Dr Alan Fong Yean Yip
Dr Chan Wei Ling
Dr Ong Tiong Kiam
Dr Liew Houng Bang
Assoc Prof Dr Annuar Rapaee
Dr Loh Chek Loong
Dr Kalwinder S Khaira
Sr Ngu Ching Huong
S/N Naini Junaidi
S/N Quinslynn Mollon
S/N Cenderella Nuah
S/N Senoriawati Zakaria
S/N Jabadah @ Jubaidah Uki
S/N Teresa Himang
S/N Wali Dihik
S/N Masni Osman
S/N Mary Kempo Tahak
J/M Kho Siew Moi

**Sultanah Aminah Hospital**
Dr Lee Chuey Yan
Dr Neoh Eu Rick
Dr Edward Mah Mun Ju
Dr Ling Kah Hing
Dr Ngeyu Ching Huat
Dr Lim Seh Kim
Dr Liew Chee Khoon
Dr Lu Hou Tee
Dr Saravanan Krishnan
Sr Rokayah Ismail
S/N Sharifah Ibrahim
S/N Rafidah Amat @ Ahmad
S/N Sarimah Abd Samad
S/N Jami'ah Abu Samah
S/N Delailah Ithnin
S/N Norhayati Hussain
S/N Azrira Abd Rahim

**Tuanku Ja'afar Hospital**
Dato' Dr Sree Raman
Dr Tan Vern Hsen
Dr Cham Yee Ling
Dr Vijiya Mala
Dr Chong Hui Min
Dr Cheah Chee Ken
Dr Aaron Hiew
Dr Wong Soo Fen
Dr Sudarshan
S/N Narizan Zulkifli

**Sultanah Bahiyah Hospital**
Dr Hasmannizar Abd Manap
Dr Billy Ching Seng Keat
S/N Napisah Shafie
S/N Khodijah Mat Isa
S/N Zarina Abdul Hamid
S/N Che Arpah Hassan
Mohd Sabri Yahaya

**Queen Elizabeth Hospital**
Dr Phanindtranath Mahadasa
Sr Wong Kath Koau
Sr Lawasa Mojimbal
S/N Shirly Angeline Gaing
S/N Felizia Alliun

**Raja Perempuan Zainab II Hospital**
Dr Hj Rosemi Salleh
Dr Monniaty Mohamed
Dr Mahiran Mustafa
Dr Norhayati Yahaya
Dr Ahmad Kashfi Abd Rahman
S/N Zuryanawati Ahmad Sekeri
S/N Wan Ruzita Wan Hassan
S/N Rafidah Mustafa
S/N Mek Semah Mamat

**Sultanah Nur Zahirah Hospital**
Dr Wan Mohd Razin Wan Hassan
Dr Ahmad Lutfi Mohamad Yusof
Sr Nor Asiah Mohamad
S/N Tuan Sharifah Tuan Dalam
S/N Asmaliza Ahmad
S/N Herney Yazida Muhaimin

**Ipoh Hospital**
Dato' Dr K Chandran
Dr Sharmita Sharma
Dr Khor Chiew Gek
Dr Nor Hanim Mohd Amin
Sr Zainab Yeop Ahmad
S/N Ratnavathy a/p P. K. Pillai

**Seberang Jaya Hospital**
Dr Ang Hock Aun
Dr Zalwani Zainuddin
Dr Khaw Chong Hui
Dr Goh Heong Keong
Sr Hasmah Salleh
S/N Rohaiza Abd Razak
S/N Choong Tsu Meili

**Malacca Hospital**
Dr Arifatul Fadzillah Musa
Dr Mooi Chin Leong
Dr Sharifah Omar
Dr Yew Teck Zuan
Dr Siti Nur Hayati Adznan
Dr Shalini a/l Dato' Vijayasingham
S/N Faridah Sharif
S/N Norliza Sahari
S/N Florence Bong S. L.
S/N Marina Yusoff
S/N Halijah Hasim

**Tengku Ampuan Rahimah Hospital**
Datin Paduka Dr Santha Kumari
S/N Salbiah

## APPENDIX F: DATA DEFINITIONS

| | |
|---|---|
| ACS stratum | Risk stratum of the patient presenting with clinical features consistent with an ACS (chest pain or overwhelming shortness of breath), defined by accompanying clinical, ECG and biochemical features |
| Bleeding complication (TIMI criteria) | The person's episode of bleeding as described by the thrombolysis in myocardial infarction (TIMI) criteria:<br><br>**Major;** Overt clinical bleeding (or documented intracranial or retroperitoneal hemorrhage) associated with a drop in hemoglobin of greater than 5 g/dl (0.5 g/l) or in hematocrit of greater than 15% (absolute)<br><br>**Minor;** Overt clinical bleeding associated with a fall in hemoglobin of 3 to less than or equal to 5g/dl (0.5 g/l) or in hematocrit of 9% to less than or equal to 15% (absolute)<br><br>**None**; No bleeding event that meets the major or minor definition |
| Blood pressure (diastolic) at presentation | The person's measured diastolic blood pressure (at presentation) |
| Blood pressure (systolic) at presentation | The person's measured systolic blood pressure (at presentation) |
| Cerebrovascular disease | Indicates if the patient has a history of stroke and/or transient ischaemic attack (TIA) or documented evidence of cerebrovascular disease (CT scan, MRI) prior to this hospital admission |
| Chronic angina (onset more than 2 weeks ago) | Indicates if the patient has an angina for more than 2 weeks prior to this hospital admission |
| Chronic lung disease | Indicates if the patient has a history of chronic lung disease including chronic obstructive pulmonary disease (COPD), chronic pulmonary fibrosis, cycstic fibrosis or bronchiectasis, or is receiving treatments for these conditions, prior to this hospital admission. Previous acute pneumonia and ventilation for acute respiratory distress are excluded |
| Chronic renal disease | Indicates if the patient has documented underlying moderate to severe impairment of renal function prior to this hospital admission |
| 'Culprit' artery | The vessel considered as responsible for the Acute Coronary Syndrome |
| Current smoker | Patient regularly smokes tobacco product / products one or more times per day or has smoked in the 30 days prior to this admission |
| Date of onset ACS symptoms | Defines the date of onset of index event resulting in admission. |
| Date patient presented | Defines the date that patient presented to the reporting centre. |

| | |
|---|---|
| Diabetes mellitus | Indicates if the patient has a history of diabetes mellitus diagnosed prior to this hospital admission or currently receiving treatment for diabetes. Defines TIMI UA/NSTEMI score. Defines TIMI STEMI score |
| Documented CAD > 50% stenosis | Indicates if the patient has angiographically-proven coronary disease involving at least 1 vessel with greater than 50% stenosis, or have undergone percutaneous angioplasty (PCI) or coronary artery bypass graft (CABG) prior to this hospital admission. Defines TIMI UA/NSTEMI score |
| Door to balloon time (mins) | The duration between time patients presented to the reporting centre to time of first angioplasty balloon inflation/stenting by the same centre. Applicable only to patients with STEMI undergoing urgent PCI. |
| Door to needle time | The duration between time patients presented to the reporting centre to time intravenous fibrinolytic therapy was administered or initiated by that same centre. Applicable only to STEMI patients receiving thrombolysis at the reporting centre |
| Dyslipidaemia | Indicates if the patient has a history of dyslipidaemia diagnosed prior to this hospital admission or currently receiving treatment for dyslipidaemia. Defines TIMI UA/NSTEMI score |
| ECG abnormalities location | Describes the area in which the main abnormalities are located on the standard 12-lead ECG |
| ECG abnormalities type | Describes the type of abnormalities seen on the ECG |
| Facilitated PCI | PCI may be performed as part of planned revascularization strategy in conjunction with pharmacological thrombolysis |
| Family history of premature cardiovascular disease | Indicates if the patient has a 1st degree family member (parents or siblings) who suffered a myocardial infarction and/or stroke before the age of 55 years. Defines TIMI UA/NSTEMI score |
| Fasting blood glucose | A method for learning how much glucose there is in a blood sample taken after an overnight fast (in mmol/L) |
| Fibrinolytic drug used | Identifies the fibrinolytic drugs used. Applicable only to patients presenting with STEMI. This data may be entered by the reporting centre for patients who received thrombolysis prior to transfer |
| Fibrinolytic therapy status | Identifies the person's fibrinolytic therapy status. Applicable only to patients presenting with STEMI. This data may be entered by the reporting centre for patients who received thrombolysis prior to transfer. Also indicates whether and where thrombolysis was given. Only thrombolysis instituted by the participating centre will be calculated for 'Door-to-Needle' time |
| Final diagnosis at discharge | Indicates one of the following the final diagnosis after all procedures and investigations had been performed<br>▪ Q-wave MI, or<br>▪ Non Q-wave MI, or<br>▪ Unstable angina, or<br>▪ Stable angina, or<br>▪ Non cardiac |

| | |
|---|---|
| Former smoker | Patient has stopped smoking tobacco products more than 30 days before this admission |
| HDL-C | The person's latest measured high-density lipoprotein cholesterol (HDL-C) latest level before event (in mmol/L) |
| Heart failure | Indicates if the patient has a history of heart failure or documented evidence (echocardiography, MRI, nuclear imaging, ventriculography) of left ventricular systolic dysfunction prior to this hospital admission |
| Heart rate at presentation | The heart rate recorded in beats per minute (at presentation) |
| Height (cm) | Measures the patient's height in cm. Measurements may be taken at any time prior to discharge. However, measurements taken after prolonged hospitalization (>2 weeks) or following surgery or prolonged intensive unit stay may not be accurate |
| Hip circumference (cm) | Measures the patient's hip circumference at presentation. Measurements may be taken at any time prior to discharge. However measurements taken after prolonged hospitalization (>2 weeks) or following surgery or prolonged intensive unit stay may not be accurate |
| Hypertension | Indicates if the patient has a history of hypertension diagnosed prior to this hospital admission or currently receiving treatment for hypertension. Defines TIMI UA/NSTEMI score. Defines TIMI STEMI score |
| Intravenous Fibrinolytic therapy (date) | The date intravenous fibrinolytic therapy was administered or initiated. Applicable only to patients presenting with STEMI. This data may be entered by the reporting centre for patients who received thrombolysis prior to transfer |
| Intravenous Fibrinolytic therapy (time) | The time intravenous fibrinolytic therapy was administered or initiated. Applicable only to patients presenting with STEMI. This data may be entered by the reporting centre for patients who received thrombolysis prior to transfer |
| Killip classification | Identifies the Killip class, as a measure of haemodynamics compromise, of the person at the time of presentation<br>**Class I** includes individuals with no clinical signs of heart failure<br>**Class II** includes individuals with rales in the lungs, an S3 gallop, and elevated jugular venous pressure<br>**Class III** describes individuals with frank pulmonary edema<br>**Class IV** describes individuals in cardiogenic shock |
| LDL-C | The person's latest measured low-density lipoprotein cholesterol (LDL-C) latest level before event (in mmol/L) |
| Left Main Stem Involvement | Left main disease (>50%) is counted as TWO-vessel disease (LAD and Circumflex). This field to be entered if there is at least 50% stenosis in the left main stem |
| Lipid Profile (fasting) | The person's measured lipid profile values |
| LVEF (%) | Ejection fraction is the percentage of the blood that fills the left ventricle during diastole that is then pumped into the body during systole. It measures the blood-pumping efficiency of the left ventricle |

| | |
|---|---|
| Myocardial infarction history | Indicates if the patient has a history of myocardial infarction prior to this hospital admission. Defines TIMI UA/NSTEMI score |
| New onset angina (Less than 2 weeks) | Indicates if the patient has an angina in the past 2 weeks prior to this hospital admission |
| No of days in CCU / ICU / CICU | Total number of days spent in a cardiac care unit (CCU) at the reporting centre only, either consecutively or intermittently |
| NSTEMI | Patients with chest pains characteristic of unstable angina AND showing evidence of biochemical myocardial necrosis. For patients who have received thrombolysis prior to admission to reporting centre, NSTEMI may also be diagnosed if after early reperfusion there may be rapid resolution of existing ST elevation associated with CK rise <2xULN or small Trop rise only |
| Number of diseased vessels | The number of major coronary vessels systems (LAD system, Circumflex system, and / or Right System) with> 50% narrowing in any angiographic view, or significant lesion defined by IVUS or pressure wire assessment |
| Number of distinct episodes of angina in past 24 hours | Number of distinct episodes of anginal pain that occurred in the 24 hours before hospital presentation |
| Peak CK | The person's maximum measured CK level over 48 hours from the time of presentation (in Unit/L) |
| Peak CK-MB | The person's maximum measured CK-MB isoenzyme over 48 hours from the time of presentation (in Unit/L) |
| Peak Troponin T / I | The person's maximum measured troponin (T / I / or both) over 48 hours from the time of presentation (in microgram/L) or state as positive or negative |
| Peripheral vascular disease | Indicates if the patient has a history and/or documented evidence and/or have undergone treatment for peripheral vascular disease (including aortic aneurysm; peripheral artery disease, intermittent claudication and/or previous peripheral artery stenting or bypass; renal artery stenosis and/or previous renal artery stenting) |
| Primary PCI | PCI intended as the primary mode of coronary revascularization |
| Rescue PCI | After initial thrombolysis, PCI may be performed when there is on-going cardiac ischemia or perceived failure of thrombolytic drug to achieve adequate reperfusion |
| Smoking status | Indicates if the patient has a history confirming any form of tobacco use in the past. This includes use of cigarettes / cigars / pipes/ tobacco chewing |
| STEMI | History consistent with diagnosis plus ST elevation in contiguous leads or new LBBB |
| Time of onset ACS symptoms | Defines the time of onset of index event resulting in admission using the 24-hour clock |
| Time patient presented | Defines the time that patient presented to the reporting centre |

| | |
|---|---|
| TIMI flow classification | Angiographic criteria of severity of coronary flow impediment prior to PCI as defined by the TIMI score.<br>0 No perfusion;<br>I Penetration without perfusion;<br>II Partial perfusion. Contrast opacifies the entire coronary bed distal to the stenosis. However the rate of entry and/or clearance is slower in the coronary bed distal to the obstruction than in comparable areas not perfused by the vessel;<br>III Complete perfusion. Filling and clearance of contrast equally rapid in the coronary bed distal to stenosis as in other coronary beds |
| TIMI Risk score for STEMI | Thrombolysis in myocardial infarction (TIMI) risk score for STEMI is based on the following criteria: (Max 14 points)<br>a) Age ≥ 75 - 3 point, Age 65 to 74 - 2 points<br>b) Diabetes OR Hypertension OR Chronic angina (onset more than 2 weeks ago) OR New onset angina (Less than 2 weeks) - 1 point<br>c) Systolic BP <100 mmHg - 3 points<br>d) Heart Rate > 100 beat per minute - 2 points<br>e) Killip II-IV - 2 points<br>f) Weight < 67 kg - 1 point<br>g) Anterior Leads: V1 to V4, Bundle Branch block (BBB) - 1 point<br>h) Time to Treatment>4 - 1 point |
| TIMI Risk score for UA/NSTEMI | Thrombolysis in myocardial infarction (TIMI) risk score for UA/NSTEMI is based on the following criteria: 1 point for each of the following criteria<br>a) Age ≥ 65<br>b) At least 3 risk factors (Past medical history: dyslipidaemia, HPT, diabetes, premature cardiovascular disease family history status)<br>c) Known CAD (stenosis ≥ 50%) (Past medical history: Myocardial infarction history, Documented CAD >50% stenosis)<br>d) ST (ECG) deviation ≥ 0.5mm (ECG Abnormalities Type: ST-segment elevation ≥ 1mm (0.1 mV) in ≥ 2 contiguous leads, ST-segment elevation ≥ 2mm (0.2 mV) in ≥ 2 contiguous leads, · ST-segment depression ≥ 0.5mm (0.05 mV) in ≥ 2 contiguous leads (includes reciprocal changes)<br>e) Recent (≤ 24 hrs) Severe angina (≥ 2 angina in last 24 hrs)<br>f) Use of anti-platelet agent (ASA) in last 7 days (Used at least one of ASA, ADP Antagonist)<br>g) Elevated cardiac enzymes/markers: CK-MB (Peak CKMB value > CKMB Reference Upper limit) and Troponin (Peak Troponin value > Troponin Reference Upper limit) |
| Total cholesterol | The person's latest measured total cholesterol latest level before event (in mmol/L) |
| Total days of admission | Total number of days spent at reporting centre from the day of admission till the day of outcome, because of discharge, transfer or patient death |

| | |
|---|---|
| Triglycerides | The person's latest measured triglycerides latest level before event (in mmol/L) |
| Unstable angina | Angina (or other distinct chest pain patterns) without evidence of biochemical myocardial necrosis BUT with any 1 of the following: (1) Angina occurring at rest and prolonged >20mins; (2) New-onset angina of at least CCS III severity; (3) Recent acceleration of angina by at least 1 CCS class. |
| Waist circumference (cm) | Measures the patient's waist circumference at presentation. Measurements may be taken at any time prior to discharge. However measurements taken after prolonged hospitalization (>2 weeks) or following surgery or prolonged intensive unit stay may not be accurate |
| Weight (kg) | Measures the patient's weight in kg. Measurements may be taken at any time prior to discharge. However, measurements taken after prolonged hospitalization (>2 weeks) or following surgery or prolonged intensive unit stay may not be accurate |